Change Table:

Date of Change	Related Issue Number	Updated by	Revision
2/28/00		F. Vranesic	Changed pages 36 - 40, 48 – 49 to reflect the addition of a dedicated performance test environment.
8/07/00		F. Vranesic	Changed pages 37, 38, 51, and appendix 11.2 to reflect implementation of WDTIP system into production. Make changes throughout document to reflect renaming of the HWDC to HHSDC
9/20/00		R. Frey	Changed format of title page and formatting of TOC page numbers.

WELFARE DATA TRACKING IMPLEMENTATION PROJECT

SYSTEM ARCHITECTURE MODEL

List of Figures

1 Introduction

1.1 Purpose

The Gartner Group defines architecture as "The manner or structure in which hardware or software is constructed. It defines how a system or program is structured, how various components and parts interact, as well as what protocols and interfaces are used for communication and cooperation between modules and components which make up the system." Within this context, the System Architecture Model deliverable will describe the components of the TRAC (Tracking Recipients Across California)Application , their interfaces, and the concept of execution among them (i.e., the relationship of the system components).

The System Architecture Model is a living document and will be updated as necessary.

1.2 Objective

The System Architecture Model deliverable describes the framework for the development of automated business processes. The objective of the document is to provide a common understanding of the TRAC Application. As such, the document is intended to be used as reference for all project participants.

1.3 Scope

The scope of the System Architecture Model deliverable includes system architecture reference documents, system overview, technical architecture, external interfaces, capacity plan, system hardware, and system software.

2 References

The Reference List subsection identifies all internal and external documents that are referenced in the System Architecture Model. The Definitions and Acronyms subsection provides a list of definitions and acronyms used throughout the document.

2.1 Reference List

Project and non-project references are listed below:

2.1.1 Project References

1. WDTIP Consultants Guidelines, "Acronyms List" section (most current version)
2. **Detailed Design Specification Document** (most current version)
3. **Updated Business Requirements Document** (most current version)
4. **Configuration Management Plan** (most current version)
5. **Project Management Plan** (most current version)

2.1.2 Non-Project References

1. MIL-STD-498, System/Subsystem Design Description (SSDD) and Interface Design Description (IDD), December 5, 1994
2. SAWS-TA's System Architecture Report, Version 1.0, December 12, 1997
3. WDTIP: Implementation Advance Planning Document Update
4. DB2 for OS/390 Application Design Guidelines for High Performance, IBM SG24-2233-00, August 1997

2.2 Definitions and Acronyms

The following is a selected list of definitions and acronyms used within the System Architecture Model. The purpose of this list is to provide a clear definition of terms used throughout the body of the document. Standard definitions were drawn from both project and non-project sources as listed in the ***Reference List*** subsection of this document. Selected project specific definitions and acronyms, as found in the **WDTIP Consultants Guidelines**, have been added to this list.

3270 & 3270 Emulation – A communication protocol between workstations and the HHSDC. An established communication link is referred to as a "session". 3270 sessions connect dedicated terminals to the HHSDC. 3270 emulation is a software driven session used to connect a workstation to the Data Center with a functionally equivalent interface.

Agent Subroutines – Programs responsible for retrieving data from database tables and manipulating/formatting data as needed before displaying it on the screens.

Architecture – The manner or structure in which hardware or software is constructed. It defines how a system or program is structured, how various components and parts interact, as well as what protocols and interfaces are used for communication and cooperation between modules and components which make up the system.

Backup – A process of creating a copy of a configuration item to prevent the loss of work.

Common logic subroutines – Programs responsible for processing functions used by multiple programs other than retrieving data from the database (i.e., error processing, screen help).

DASD – Direct Access Storage Devices (DASD) attached as peripheral devices to the mainframe computer.

Database – A collection of interrelated data stored together in one or more computerized files.

DB2 – Data Base 2 (DB2) is a relational database product from IBM. It operates in a mainframe environment with communication capability to many programming languages and to other database products operating in the same or other environments.

DB2 Bufferpool – A block of memory allocated to DB2 to support the input and output of data. Data retrieved from the database by query operations is staged to the bufferpool prior to delivery to the user. Subsequent requests for data are first satisfied from the bufferpool if possible, prior to accessing the data on the physical storage devices associated with the database. Memory access is much faster than DASD access, so this method is used primarily as a speed and efficiency enhancement to DB2.

DB2 Index - A logical entity internal to DB2 that defines both the physical storage and structure of an access path within the database. Indexes exist as separate files associated with tables. They are unique to the table with which they are defined.

DB2 Subsystem – A single copy of DB2 running on the mainframe computer. Each subsystem has unique associated resources such as buffer pools and system catalogs.

DB2 Table – A logical entity internal to DB2 that defines the structure of a named collection of data attributes. Tables often correlate closely to the entities and attributes defined in the logical data model. Tables utilize the storage space defined in tablespaces and are contained entirely within them.

DB2 Tablespace – A logical entity internal to DB2 that represents defined physical storage within a database.

Function – A defined objective or characteristic action of a system or component. For example, a system may have inventory control as its primary function.

Gigabyte – 1,073,741,824 bytes. A byte is a series of bits of a particular length, usually 8. Computer storage space is measured in bytes.

HHSDC – The Health and Human Services Agency Data Center (HHSDC) is the location of the mainframe computers and the associated peripheral devices that support the TRAC Application.

ISAWS - Interim Statewide Automated Welfare System

LEADER – Los Angeles Eligibility, Automated Determination, Evaluation and Reporting System

Logical Entity - A named item or object that represents an operating concept as opposed to a strictly physical thing. An example would be a database object such as a DB2 table, which represents a collection of defined data but not the physical storage used to contain that data.

Mainframe – A computer or system of computers designed for the uninterrupted processing of data. Mainframe computers are designed to support the requirements of multiple users, or groups of users. The processing capacity of mainframe systems varies within broad parameters. Special environmental and security concerns often limit the physical placement of these systems.

May - Indicates an item or activity appropriate under some, but not all, conditions; for which there are a number of acceptable alternatives; or for which there is no professional consensus.

MVS – Short for Multiple Virtual Storage (MVS), the operating system for older IBM mainframes. MVS was first introduced in 1974 and continues to be used, though it has been largely superseded by IBM's newer operating system, OS/390.

OS/390 - An IBM mainframe operating system, featuring integrated MVS, UNIX, LAN, distributed computing and application enablement services through its base elements. These base services enable open, distributed processing and offer a foundation for object-

ready application development. The OS/390 base includes a Communication Server that includes VTAM, the VTAM AnyNet feature, TCP/IP and TIOC. It provides SNA (3270), APPC, High Performance Routing, ATM support, sockets and RPC.

Peripheral Devices – Computing equipment connected by direct communication channels to a mainframe computer. Peripheral devices include disk drives, tape drives and printers.

RAID – Redundant Array of Independent (or Inexpensive) Disks (RAID) is a category of disk drives that employ two or more drives in combination for fault tolerance and performance. There are a number of different RAID levels. The three most common are 0, 3 and 5:

- **Level 0:** Provides *data striping* (spreading out blocks of each file across multiple disks) but no redundancy. This improves performance but does not deliver fault tolerance.
- **Level 3:** Same as Level 0, but also reserves one dedicated disk for error correction data. It provides good performance and some level of fault tolerance.
- **Level 5:** Provides data striping at the byte level and also stripe error correction information. This results in excellent performance and good fault tolerance.

Reject - For the purposes of this document, a disapproval is synonymous with a reject.

Referential Integrity – A set of relationships specifying a dependency between attributes in the data model. Referential Integrity rules can define parent – child relationships or require existence testing prior to an update operation. They can be defined within the database code or within the application logic that interfaces with the database.

Shall - Indicates an item or activity is required.

Should - Indicates an item or activity is recommended.

SIS – SAWS Information System

SQL – Structured Query Language (SQL) is the programming language used to access data stored in DB2 databases.

TCP/IP –Transmission Control Protocol/Internet Protocol (TCP/IP) is the basic communication language or protocol of the Internet. It can also be used as a communications protocol in the private networks called intranets and extranets.

VTAM – Virtual Telecommunications Access Method (VTAM) is the primary communication protocol between the HHSDC mainframe and terminals connected as either 3270 or 3270 emulation sessions.

Welfare Data Tracking Implementation Project (WDTIP) – The official name of the project that is the subject of this document.

Will - Indicates an item or activity is a goal, which may or may not be attainable. See Shall.

3 Project Overview

3.1 Project Definition

The WDTIP is an application development project that includes overall project management; designing, building and testing the system; developing and executing user training; communicating with internal and external stakeholders; and deploying the TRAC Application. In addition, data will be converted from county systems to the TRAC Database. It is anticipated that this conversion will entail both automated and manual methods. Subsequent ongoing batch data loads from the counties are also included in the WDTIP. The scope of the project is further discussed in the ***Project Scope*** section of this document.

3.2 Project Purpose and Objectives

In response to the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996, the State of California passed Assembly Bill (AB) 1542. AB-1542 institutes the TANF program in California and imposes welfare time limits, as well as new programmatic and eligibility rules. In addition to welfare time limits, AB-1542 mandates work requirements through the CalWORKs program. As a result of the CalWORKs program, county welfare departments are required to have a mechanism to track eligibility time limits, and other related data on an individual level, across counties, and over time to comply with the tracking requirements of both State and Federal mandates.

The purpose of the WDTIP, therefore, is to provide a communication mechanism and central data repository that can be accessed by all technology-enabled counties and relevant agency systems in order to prevent welfare fraud and meet the requirements of SAWS legislation and the TANF and CalWORKs programs. It address the immediate need for Federal and State Welfare Reform tracking requirements imposed by the Federal PRWORA, AB 1542 and relevant All County Letters issued by the California Department of Social Services (CDSS).

To this end, the objectives of the project are to satisfy the aforementioned legislative requirements by providing a statewide repository for welfare reform data elements and to facilitate communication between disparate county welfare and statewide welfare-related systems. The primary data to be collected, calculated (if necessary), and tracked for applicants/ recipients includes:

- TANF 60-Month Clock
- CalWORKs 60-Month Clock
- Welfare-to-Work 18/24-Month Clock

3.3 Project Scope

The overall objective of the WDTIP is to provide a communication mechanism and central data repository that can be accessed by all technology-enabled counties and relevant agency systems. In addition, it must enable counties to prevent welfare fraud and meet the requirements of Welfare Reform. The scope of the WDTIP includes design, construction, testing, and implementation of an application that will allow all 58 California counties to accurately track individual welfare recipient information to meet the requirements of both State and Federal welfare reform. The project also consists of the development of CICS screens to view data and approximately 10 operations and management reports. A one-time conversion of county data will be required for the initial load into the database with subsequent ongoing loads performed by counties. Examples of data to be tracked include:

- PRWORA time clock calculation
- CalWORKs time clock calculations, including exceptions and exemptions
- Diversion information
- Other tracking to be defined by the WDTIP Joint Requirements Planning Workgroup (e.g., sanctions, childcare, work participation, case participation, etc.)

The conversion of county data to populate the TRAC database will be a vital component of the WDTIP. To this end, the project scope includes the following conversion activities: design, development, testing and implementation of conversion programs, including, but not limited to:

- Identification of required county data elements to populate TRAC
- Identification of county file format requirements
- Development of edit and error processing rules
- Assistance with the one-time initial conversion
- Development of ongoing load requirements for county data into the TRAC
- Guidance for development of extract requirements to county technical resources

In addition, the scope of the project will include the following implementation activities:

- Regional training sessions
- Regional information sessions
- County visits as needed
- Consistent and ongoing communication with stakeholders
- Implementation support

The scope of this project does not include:

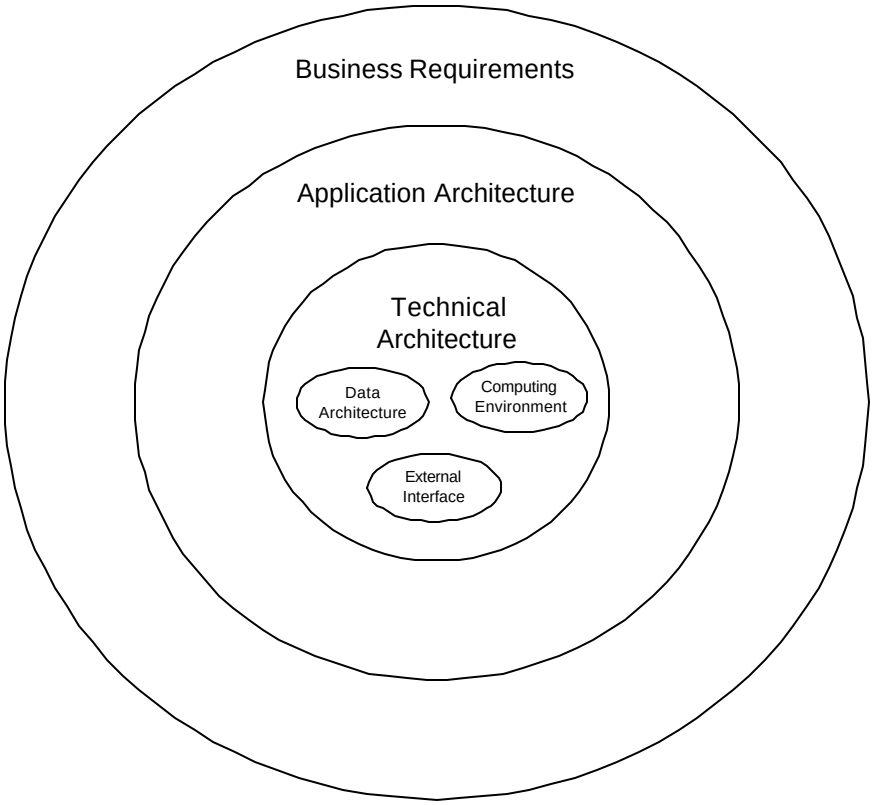
- Resources to convert county data into a standard file for conversion and ongoing data loads

- Assisting agencies/counties with the design and development of county welfare system screens to view TRAC data
- Development or management of any changes to the Statewide Client Index (SCI) application

4 System Overview

In general, system architecture is composed of the Technical Architecture, Application Architecture and Business Requirements. Below is a conceptual illustration of the system architecture model.

Figure 1: System Architecture Model



The Technical Architecture describes the computing infrastructure of the system including the data architecture, computing environment and external interfaces. The data architecture addresses the handling of data and the support of the TRAC Application functions. The computing environment addresses the components of the system and the relationships between those components and how they are used during the development, testing and implementation of the project. The external interfaces describe the various linkages between the TRAC Application to other external systems.

The Technical Architecture is required to support the TRAC Application architecture, the second layer of the system architecture. The Application Architecture describes the TRAC Application structure, common services and standards required by the TRAC Application independent of business function.

The outermost layer is the Business Requirements, which provides the business context in developing the TRAC Application.

This section will begin with a discussion of what is being built, the purpose of the system, and the major business requirements that define the system. The section will also include a brief discussion of the phased approach in developing the TRAC Application.

4.1 What is being built?

The TRAC Application will provide a communication mechanism and central data repository that can be accessed by all State of California counties. The system will provide the ability to track recipient/applicant data specific to the correct calculation of the TANF 60-month, CalWORKs 60-month, and CalWORKs 18/24-month time clocks. Additionally, the TRAC Application will provide non-time clock functionality as it currently exists in the Pre-SAWS application.

The system includes a central data repository called TRAC Database and a significantly enhanced communication infrastructure. Presently, if a county worker wants information on an applicant or a client from multiple sources, they must logon to multiple terminals or place telephone calls to other counties, state agencies or service providers. The price of this inefficient access to information is slow customer service, incorrect data due to re-keying, duplication of data and increased personnel costs.

After implementation of the TRAC Application, counties will connect via MEDS. This will allow access to the TRAC database for on-line inquiry and update as well as providing a mechanism for access to basic client information by all counties.

The TRAC database is currently implemented in DB2 on an IBM ES/9000 residing at the HHSDC. This database, coupled with the Statewide Client Index (SCI) database, will store information on all welfare recipients in California, including central statewide identification (Client Identification Number), detailed individual information and information on each client's program involvement.

4.2 Purpose of the system

4.2.1 Why is the system being built?

The purpose for building the system is rooted in legislative mandates. The system provides several fundamental benefits to California's counties, including but not limited to:

- Inter-county exchange of welfare-related data
- Centralized data repository for Statewide file clearance against SCI
- Centralized data repository to calculate TANF and CalWORKs time on aid including exceptions and exemptions
- Access to data through pre-defined screens, batch processes, and file transfers

4.2.2 Impact of the System on Current Business Process

The TRAC Application will directly and profoundly impact all of the 58 California counties by providing a single repository - TRAC - for obtaining statewide information necessary to determine eligibility. The impact can be measured in terms of:

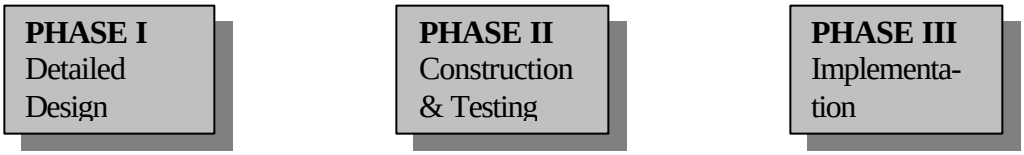
- Substantial time savings realized in determining eligibility
- More accurate eligibility determinations and a reduction in grant overpayments
- A reduction in welfare fraud
- More expeditious service to applicants in need of assistance

Although the current Pre-SAWS application provides a system calculated time-on-aid field, the calculation is not currently accurate because it does not capture exemptions/exceptions, diversion months, work participation, and other data elements necessary for accurate time clock calculations. The system will include tables in the TRAC database to capture this data. Because MEDS does not carry this data, a one-time conversion of county data will be required to populate the TRAC tables. After conversion, each county will send a daily batch update to the TRAC database with any changes in status. The system will have all the data necessary to compute the total time on aid for each individual welfare recipient in the State of California.

4.3 Project Phases

The design, construction and testing, and implementation of the TRAC Application is based on the Systems Development Lifecycle (SDLC) methodology. The SDLC incorporates a phased approach in systems implementation. The three phases are illustrated in the figure below. Additional details on the WDTIP activities of phases I, II and III are provided in the **Project Management Plan** deliverable.

Figure 2: System Development Lifecycle Phases



4.3.1 Phase I

Phase I WDTIP activities will focus primarily on overall project management, developing project standards, updating the stakeholder communication plan, revising the business requirements, producing the detailed design for the system, and developing the implementation strategy. The timeframe for Phase I WDTIP activities will be from 6/1/99 to 9/30/99.

4.3.2 Phase II

Phase II WDTIP activities will focus primarily on overall project management, building and testing of the system, creating the implementation plan, and developing the user training curriculum. The timeframe for Phase II WDTIP activities will be from 10/1/99 to 3/31/00.

4.3.3 Phase III

Phase III WDTIP activities will focus primarily on overall project management, user acceptance testing, county data conversions, user training, and system deployment. The timeframe for Phase III WDTIP activities will be from 4/3/00 to 12/31/00.

4.4 Major Business Requirements of the System

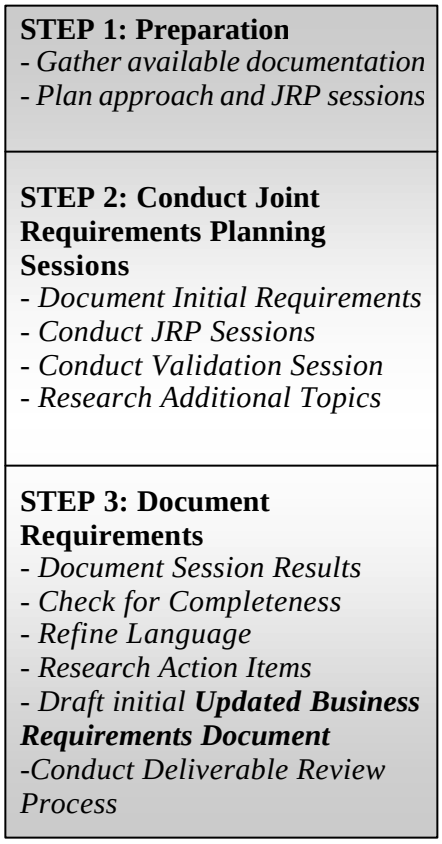
This section will include a summary of the business specification methodology and business requirements of the system by functional areas. This will provide further business context for the system being built. A detailed discussion of the business specification methodology, business and technical requirements is provided in the **Updated Business Requirements Document**.

4.4.1 Approach

To accurately and completely identify the functionality of the TRAC Application, the WDTIP Team followed a structured approach. This approach included participants from the WDTIP Team and Subject Matter Experts (SMEs) from the counties and other State agencies and data sources necessary to complete the requirement identification and validation.

The WDTIP Team has leveraged the work done to identify requirements during the SAWS-TA Project. To that end, rather than completely recreating the requirements from scratch, the WDTIP Team reviewed the requirements documentation from SAWS-TA and compared them against the scope of WDTIP. This advantage allowed a more rapid requirements validation process. The steps used in this process are displayed on the next page. The **Updated Business Requirements Document** provides more detail on each of these steps.

Figure 3: Business Requirements Collection Process



4.4.2 Business Requirements

Business requirements detail the necessary functionality to enable specific practices of the users of the TRAC Application (what the TRAC Application needs to do). These business requirements have been grouped into the functional areas listed below. Refer to the **Updated Business Requirements Document** for details of these functional requirements.

- Functional Requirements
  - Diversion
  - Time Clocks
  - Sanctions
  - Initial and On-Going Data Loads
  - Interface

Additionally, technical requirements detail how the business requirements will be technically implemented. Refer to the **Updated Business Requirements Document** for details of these, and other technical requirements.

- Technical Requirements
  - Screens
  - Reports
  - Security
  - Audit Control
  - Backup

4.5 Assumptions and Dependencies

The design and documentation of the System Architecture Model is based upon several business and technical assumptions. These assumptions have allowed system-wide design decisions to be made that provide a common frame of reference for the components and interfaces of the system.

Refer to the **Updated Business Requirements Document**, Section 5, Assumptions, for a description of the business related assumptions. Among the technical assumptions made in this document are:

- The project will be developed, tested, and implemented on an OS/390 compatible mainframe computer
- The computing systems of the Health and Human Services Agency Data Center (HHSDC) will be used to support the development, testing, and implementation of the TRAC Application
- The central database of the TRAC Application will be implemented on IBM's DB2 database platform
- All database storage will be contained within the DB2 capacity of the HHSDC. No distributed processing incorporating the county databases will be used
- End users will gain access to the TRAC Application database through CICS transactions running on 3270 or 3270 emulation terminals

Additional technical assumptions will be determined and documented in the **Updated Business Requirements Document** by August 31, 1999.

5 Application Architecture

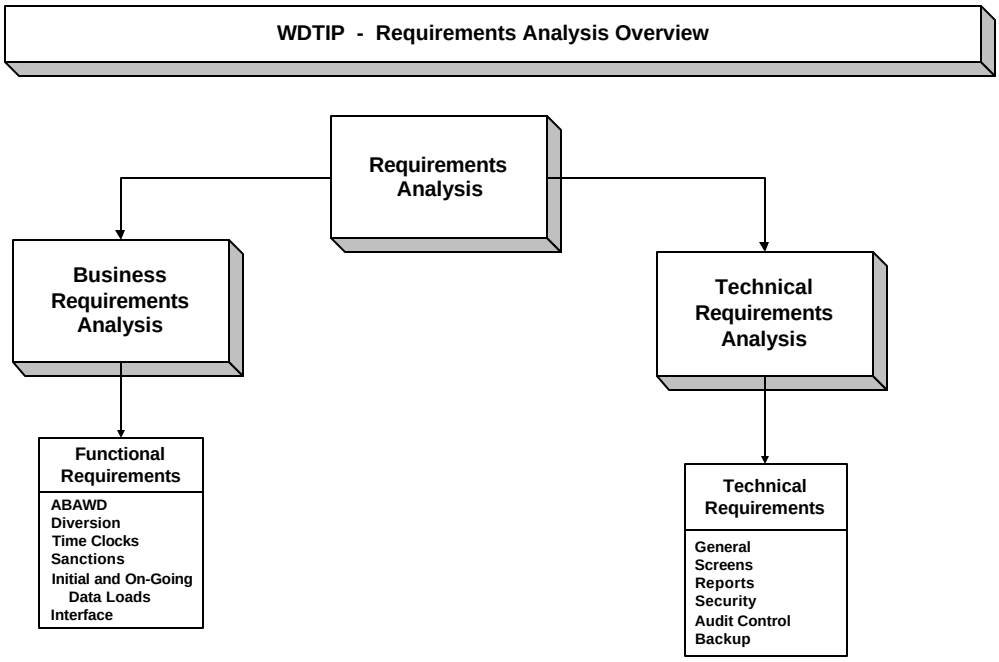
The TRAC Application architecture defines the relationships and dependencies between groups of related business processes, called functional areas. It describes the physical structures and common services required by the TRAC Application to support the functional areas that have been identified. The definition of functional areas begins with the business requirements analysis. That analysis resolves the requirements that drive the architecture of the system.

5.1 Requirements Analysis Summary

TRAC Requirements Analysis was completed in July 1999. The purpose of the analysis was to validate and update the requirements analysis performed for the SAWS-TA project. That project preceded the WDTIP and provides a basis for the system currently under construction. This subsection will briefly summarize the findings of the analysis to provide context to the discussion on TRAC Application architecture; it is not intended to recap the requirements analysis in this document. Complete information is available on this subject in the **Updated Business Requirements Document**.

The figure below provides an overview of the requirements analysis process and the split between business requirements and technical requirements.

Figure 4: Requirements Analysis Overview



There are two main components of requirements analysis. The first is Business Requirements Analysis, which primarily focuses on identifying and defining the

fundamental, intrinsic business processes that must be embodied in the information system to be developed.

The second component is Technical Requirements Analysis, which addresses environmental and system-related requirements. This aspect of requirements analysis provides the framework for the TRAC Application architecture of the system.

5.1.1 Business Requirements Analysis

The Business Requirements Analysis of the TRAC Application provides a detailed discussion of the necessary functionality to enable specific practices of the users of the TRAC Application. In other words, this analysis identifies what the TRAC Application must be able to do. That set of business requirements and the associated technical requirements analysis provides the starting point for the design of the TRAC Application architecture.

5.1.2 Technical Requirements Analysis

Technical Requirements Analysis addresses system-wide needs across the different functional areas of the TRAC Application. The business requirements analysis identified ***what*** the system must do and the technical requirements define ***how*** these functions can be accomplished. This type of analysis is concerned with first identifying and then decomposing the essential system components that are "required" to meet the objectives of the system. Six components have been identified as requirements to support the functionality of the system. Additional components may be identified during the ongoing design of the TRAC Application.

1. The general requirements within the Technical Requirements Analysis cover a variety of requirements such as data ownership, database software and system access not specific to any one technical sub-section. The details of the general requirements are discussed in the **Detailed Design Specification Document**.
2. Screen requirements provide functionality for developing the systems online interface. This requirement is supported in the Online Data Inquiry and Online Data Update subsections of the ***Application Architecture*** section of this document. The details of the screen layouts are discussed in the **Detailed Design Specification Document**.
3. Report requirements provide functionality for developing reports for delivery to the users. This requirement is supported in the Ongoing Batch Processes subsection of the ***Application Architecture*** section of this document. The details of the report layouts are discussed in the **Detailed Design Specification Document**.
4. Security requirements provide the guidelines for restricting and defining different levels of access to the TRAC Application data. This requirement is supported through the Online Data Inquiry and Online Data Update subsection of the ***Application Architecture*** section of this document. The details of the security implementation in the TRAC Application are discussed in the **Detailed Design Specification Document**.

5. Audit Control provides a mechanism for tracking historical information about transactions that are processed in the TRAC Application. This requirement is supported through the Data Architecture subsection of the ***Technical Architecture*** section of this document.

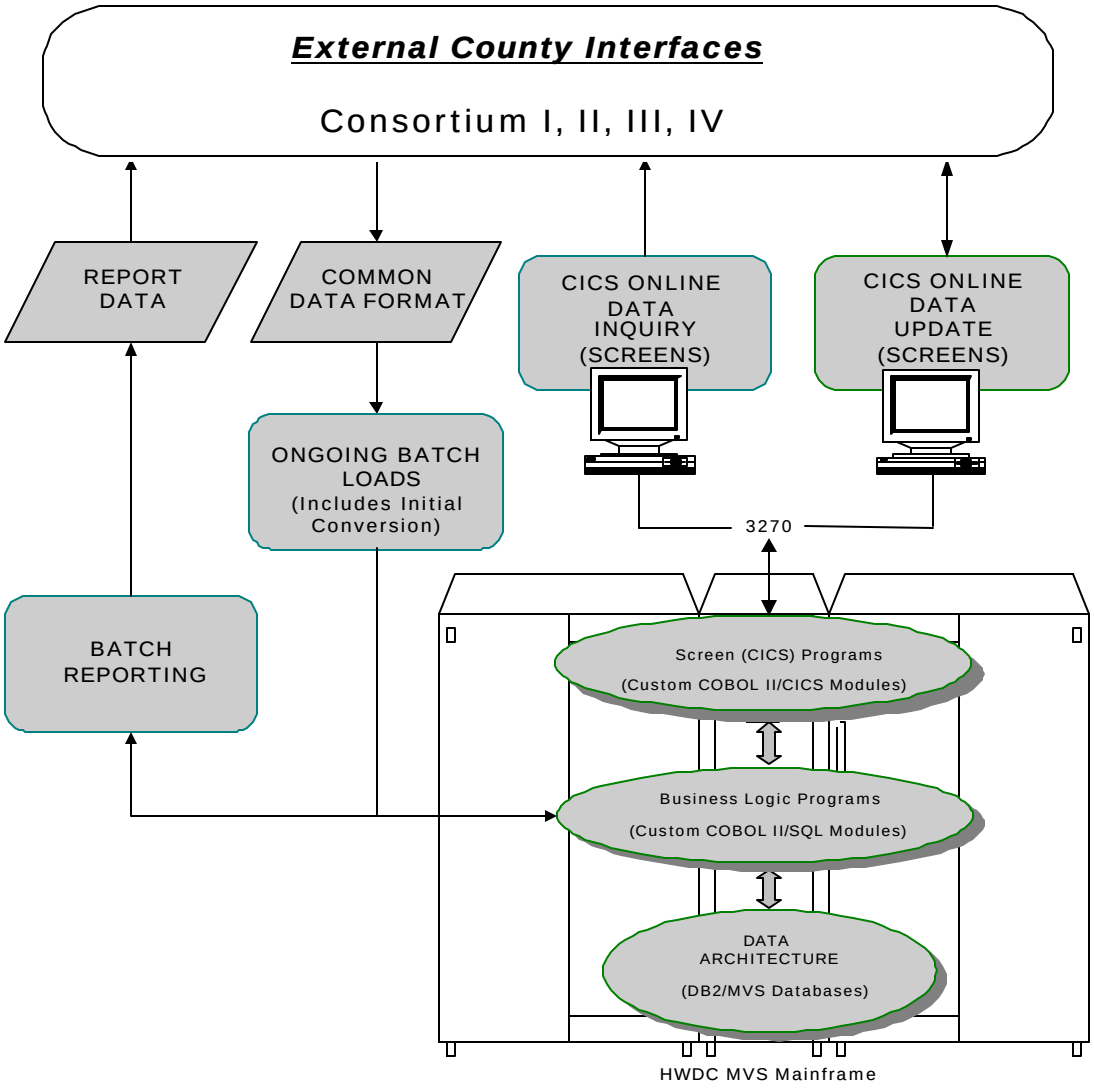
6. Backups provide functionality for recovering TRAC Application data. This requirement is supported through the Data Architecture subsection of the ***Technical Architecture*** section of this document. The details of the backup and recovery specifications for the TRAC Application are included in the **Detailed Design Specification Document**.

5.2 Functional Subject Areas

Functional subject areas provide an application context to the technical requirements of the system. The technical requirements analysis deals with issues that are independent of the specific functions required of the TRAC Application. As an example, consider that the technical requirements of screens and security are applicable to all functional areas of the architecture. In order to define the specific capacities and interfaces for the system, the application must identify the function being performed at the time the technical component is being used.

The functional analysis activity in the WDTIP identified three primary functional areas within the TRAC Application architecture of the project. These areas are Ongoing Batch Processes, Online Data Inquiry, and Online Data Update. The following figure shows the relationship of these functional areas to each other and to the architecture of the system as a whole.

Figure 5: Application Architecture Functional Overview



The TRAC Application architecture functional overview depicts the internal application layers of the architecture as well as the three primary functional areas of the system. Each of the primary functional areas will be discussed in greater detail within this section of the document. The TRAC Application layers shown in the figure are common to several of the functions. The areas shown on this figure include:

- *External County Interfaces*. The TRAC Application will interface with each of the 58 systems in the State of California. All counties will supply data to the batch load and conversion process; they will also have access to the online interface of the system.
- *Ongoing Batch Loads Including Initial Conversion*. The data in the system is derived from sources in the individual counties via batch processes. Counties will provide data in a common file format to support the initial conversion of their

information into the system. This same common file format and transmission process will be used on a regular basis to provide input for the ongoing batch loads that populate the majority of the information stored within the system.

- *Batch reporting*. Batch reporting will provide static summary and detailed information about the system in formatted outputs. Reports will be transmitted electronically to the counties for inspection.
- *CICS Online Data Inquiry (Screens)*. Each county will be provided with online data inquiry via CICS transactions. Access will be accomplished using either 3270 or 3270 emulation connections between the counties and the HHSDC.
- *CICS Online Data Update (Screens)*. Each county will be provided with limited online data update capability via CICS transactions. Access will be accomplished using either 3270 or 3270 emulation connections between counties and the HHSDC. Data which can be modified through the county system's batch processes will not be updateable online in the TRAC Application. The data that may be updated online includes diversion, non-California months, supportive services only and child support reimbursement information.
- *Screen (CICS) Programs*. Screen programs are those programs whose function is to display data on a screen. Online transaction support is implemented using custom programs written using COBOL and CICS.
- *Business Logic Programs*. Database access is provided to the online transactions through a series of agent subroutines and common logic subroutines. Refer to the ***Definitions and Acronyms*** section of this document for a definition of agent subroutines and common logic subroutines. Batch programs may also use these programs for database access, but may contain custom SQL statements when appropriate to support unique requirements. All programs are written using COBOL and SQL.
- *Data Architecture*. The physical implementation of the logical data model of the system. The databases supporting the TRAC Application are implemented in DB2 on the mainframe computer at the HHSDC.

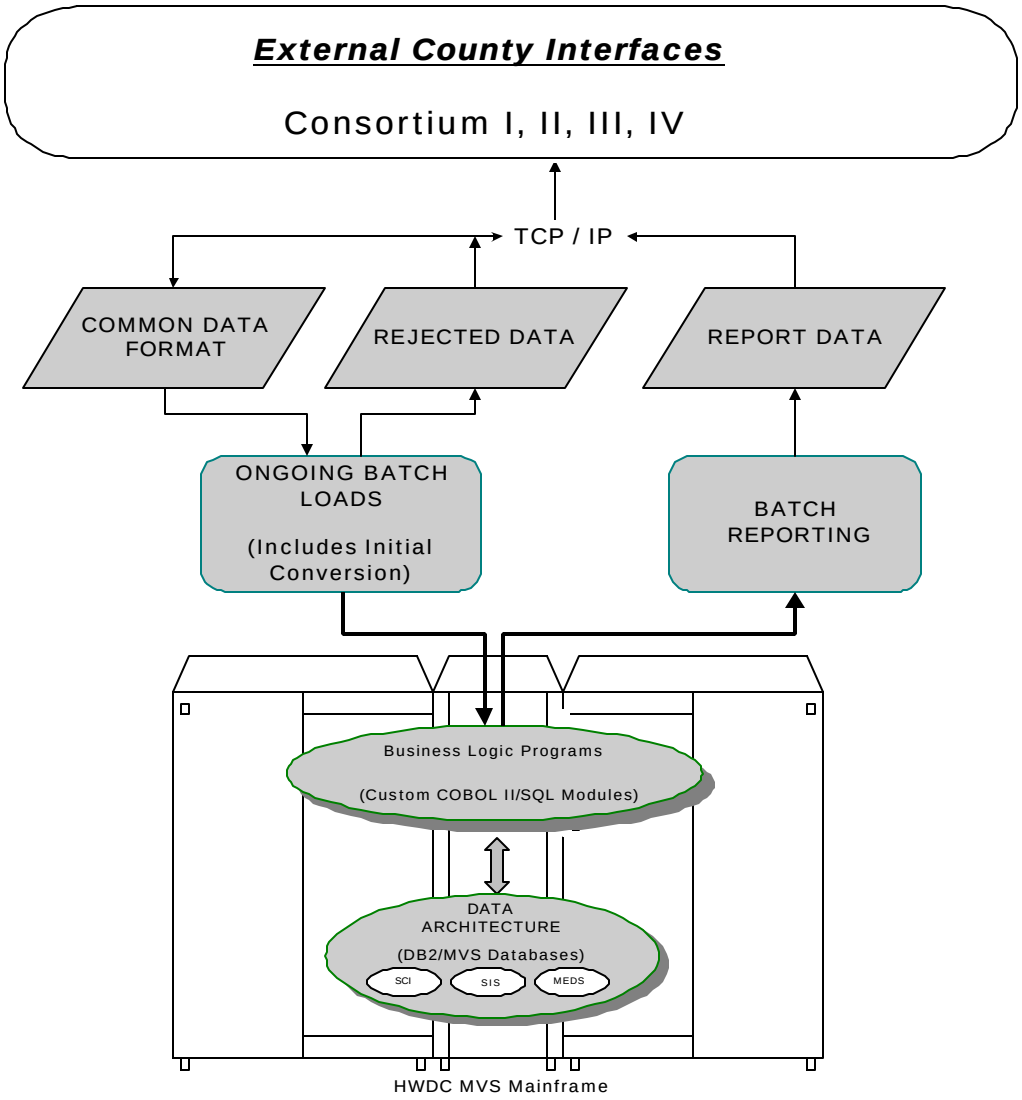
5.2.1 Ongoing Batch Processes

The data stored in the central database of the system is derived from sources in the individual counties via batch processes. Counties will provide data in a common file format to support the initial conversion of their information into the database. The same common file format and transmission process will be used on a regular basis to provide input for the ongoing batch loads that populate the majority of the information stored within the system.

Batch reporting will provide static summary and detailed information about the system in formatted outputs. Report data will be sent electronically to the counties for their inspection.

The figure below shows the relationship between components used in this function:

Figure 6: Ongoing Batch Processes



The Ongoing Batch Processes diagram includes the following components:

- *External County Interfaces*. The TRAC Application will interface with all of the counties in the State of California. Counties are grouped together in one of four consortia throughout the State. The four consortia comprise all 58 counties in the state. All counties will supply data for the batch load and conversion process through the interface that utilizes the common data format. The consortia are described in further detail in the ***External Interfaces*** section of this document.
- *Common Data Format*. Batch transmissions from the counties to the TRAC Application will be arranged according to a common data format. This format will specify the minimum set of data attributes that must be supplied in order to

interface with the TRAC Application. Detailed specifications of this file can be found in the **Detailed Design Specification Document**.

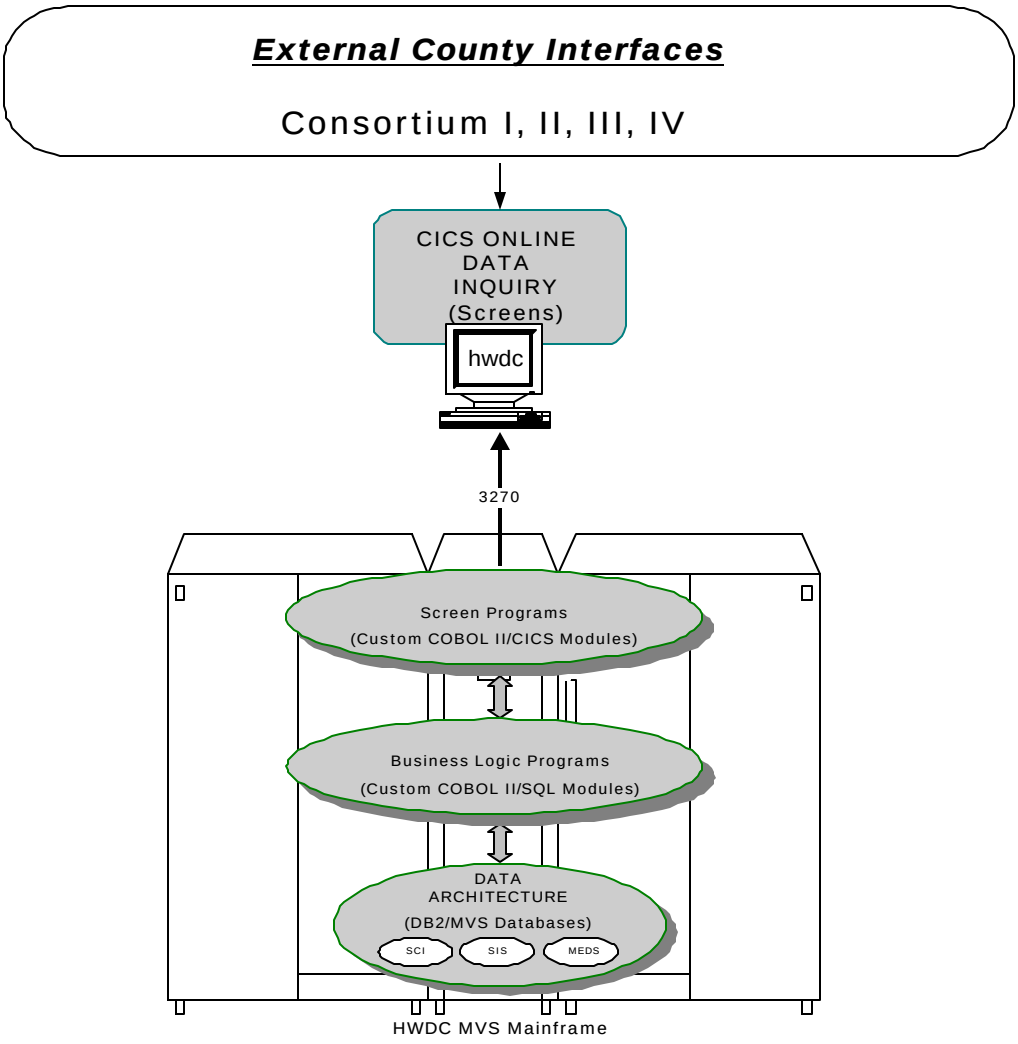
- *Rejected Data.* Batch transmissions from the counties to the TRAC Application will be edited by the TRAC Application before being posted to the database. Data that does not pass the edits may be returned to the originating county via the same transmission protocol that was utilized for the original transmission.
- *Ongoing Batch Loads Including Conversion*. A series of custom batch programs written to read the data in the common data format and load that information into the TRAC database.
- *Batch reporting*. A series of custom batch programs that provide summary and detailed information about the data contained within the system in user-defined formatted outputs. Reports will be transmitted electronically to the counties for inspection.
- *Report Data.* The output of the batch reporting function will be files of report data. These files will be transmitted back to the counties for their use via the same transmission process that supplies the other data files being sent between the counties and the HHSDC.
- *Business Logic Programs*. Database access for the batch programs will be provided through a combination of common logic subroutines and custom SQL. The common logic programs are written using COBOL and SQL.
- *Data Architecture*. The physical implementation of the logical data model of the system. The databases supporting the TRAC Application are implemented in DB2 on the mainframe computer at the HHSDC. The batch load cycle will post data to the production TRAC database only.

5.2.2 Online Data Inquiry

Each county will be provided with online data inquiry access to the database. This access will be accomplished using either 3270 or 3270 emulation connections between the county workstations and the HHSDC. Access to the system will be restricted with passwords and user ID profiles that are verified at logon to the system.

The following figure shows the relationship of components used in this function.

Figure 7: Online Data Inquiry



The Online Data Inquiry diagram includes the following components:

- *External County Interfaces*. The TRAC Application will interface with all of the counties in the State of California. The counties are members of organizations called consortia. The four consortia comprise all 58 counties in the state. The

consortia are described in further detail in the ***External Interfaces*** section of this document.

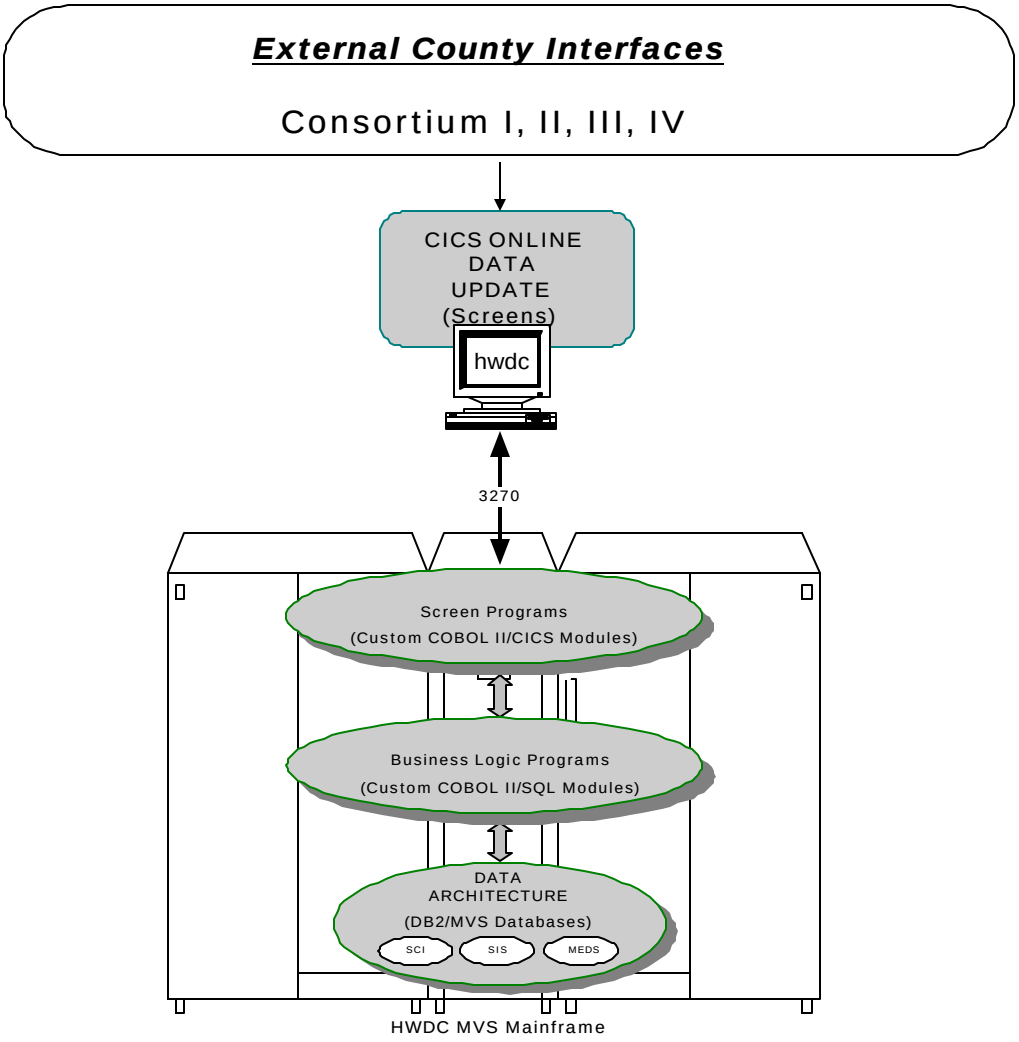
- *CICS Online Data Inquiry (Screens)*. A series of custom CICS screens that present TRAC data in a formatted manner. Users of the system will gain access to the TRAC Application by first logging on to the MEDS application. Access security will be provided by MEDS. No access will be allowed to the TRAC screens without first passing MEDS logon security access.
- *Screen Programs.* A series of custom COBOL / CICS programs (agent subroutines) written to read the data in the database and display that information to the users via formatted CICS screens.
- *Business Logic Programs.* Database access for the online programs will be provided through a combination of agent subroutines, common logic subroutines and custom SQL statements. The business logic programs are written using COBOL and SQL.
- *Data Architecture*. The physical implementation of the logical data model of the system. The databases supporting the TRAC Application are implemented in DB2 on the mainframe computer at the HHSDC. The online inquiry applications will read data from both the TRAC and SCI databases.

5.2.3 Online Data Update

Counties will be provided with the capacity for limited online data update access to the database. The purpose of this functionality is to allow counties to add/update data which cannot be modified through the counties batch processes. Specific details of the attributes that can be updated will vary with the requirements of the county. Refer to the **Updated Business Requirements Document** for additional information on update requirements.

The following figure shows the relationship of components used in this function.

Figure 8: Online Data Update



The Online Data Update diagram includes the following components:

- *External County Interfaces*. The TRAC Application will interface with all of the counties in the State of California. The counties are members of organizations called consortia. The four consortia comprise all 58 counties in the state. The consortia are described in further detail in the ***External Interfaces*** section of this document.
- *CICS Online Data Update (Screens)*. A series of custom CICS screens that present TRAC data in a formatted manner. Users of the system will gain access to the TRAC Application by first logging on to the MEDS application. Access security will be provided by MEDS. No access will be allowed to the TRAC screens without first passing MEDS logon security access. Additional security for update transactions will be provided at the application level within the TRAC CICS programs.
- *Screen Programs.* A series of custom COBOL/CICS programs written to select, insert, update, and delete data in the database and display that information to the users via formatted CICS screens. Online delete functionality is only available on a limited basis.
- *Business Logic Programs.* Database access for the online programs will be provided through a combination of agent subroutines, common logic subroutines and custom SQL. The online programs are written using COBOL and SQL.
- *Data Architecture*. The physical implementation of the logical data model of the system. The databases supporting the TRAC Application are implemented in DB2 on the mainframe computer at the HHSDC. The online data update applications will access data from both the TRAC and SCI databases. Only TRAC database attributes will be available for update.

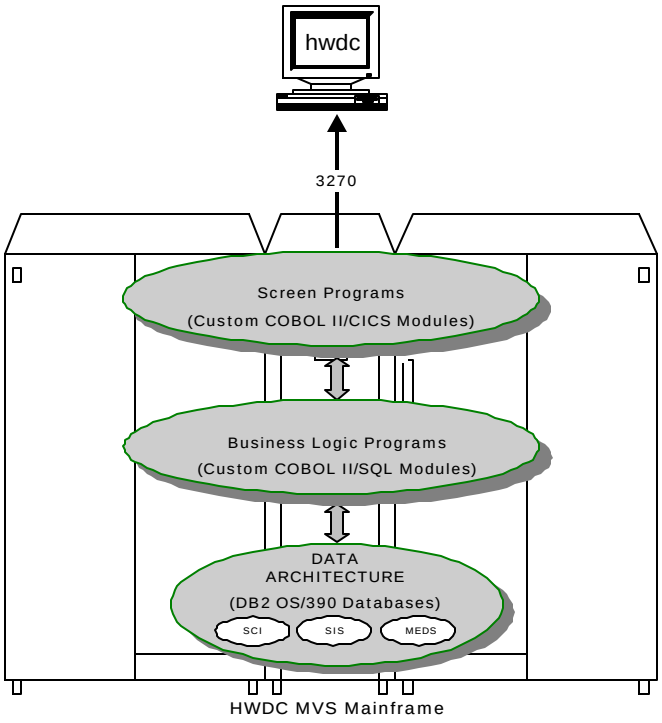
6 Technical Architecture

The technical architecture sets standards and direction for the types of tools, methods and technology to be implemented in the organizations' computing environments. The architecture will describe the structure required to support different layers of the TRAC Application architecture. Each layers' architecture supports a specific function of the system. The layers work together to provide a framework upon which the TRAC Application can be developed, tested and implemented.

6.1 Technical Platform

The TRAC Application rests upon a technical foundation, or platform, that is composed of layers. The system can be separated into four component layers as shown in the following figure:

Figure 9: Technical Architecture Layers



The layers of the architecture correspond to the functional layers described in the ***Application Architecture*** section of this document.

- The *Connection Layer* provides online access to the TRAC Application. CICS programs will transmit the terminal addresses assigned to the user terminals when the session is established. This layer will run on the 3270 dedicated terminals or 3270 terminal emulation platforms, depending on the user.

- The *Screens Layer* contains custom coded applications to access the TRAC Application. These screen programs are those programs whose function is to display data on a screen. Programs are written in COBOL and include CICS and SQL subroutines. This layer will reside on the mainframe computer at the HHSDC.

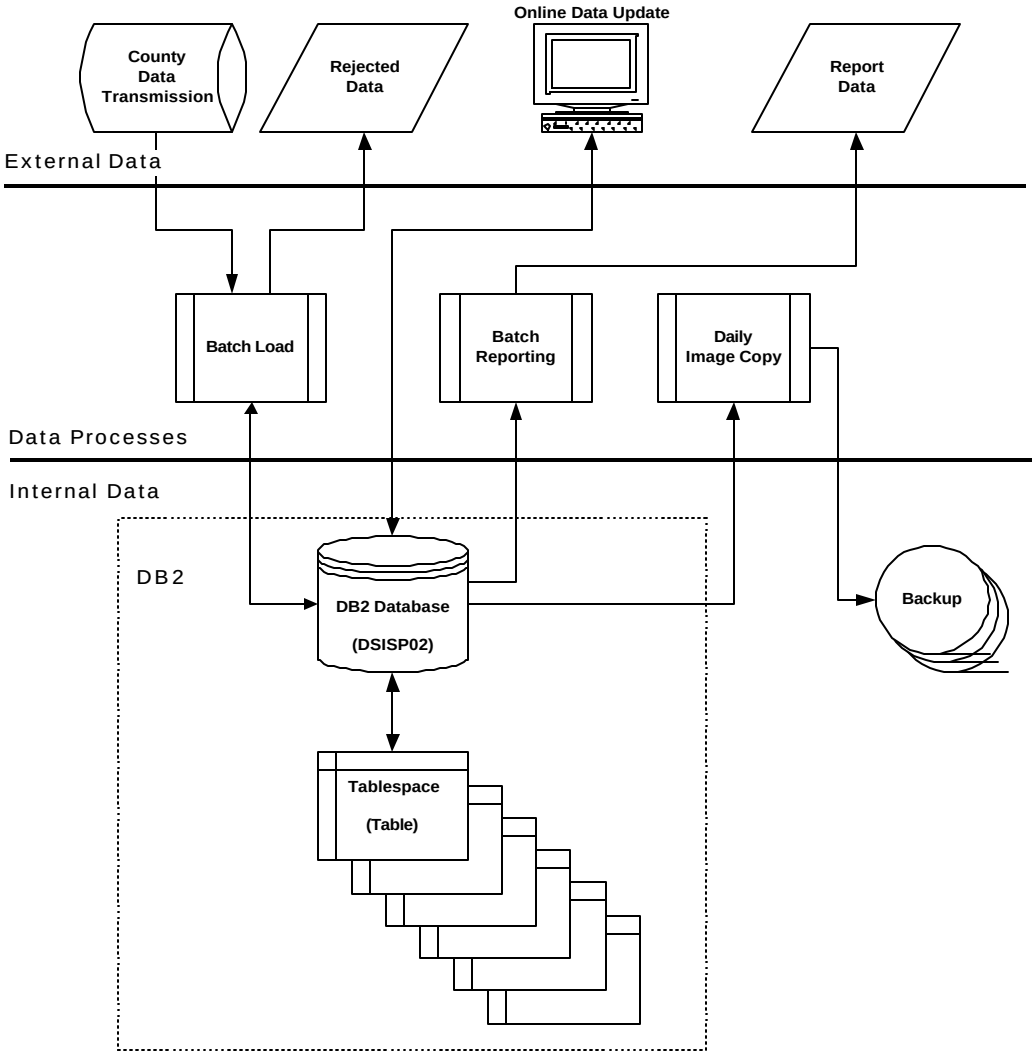
- The *Business Logic Layer* provides database access to the TRAC Application programs through a series of agent subroutines and common logic subroutines. All programs are written in COBOL and SQL. This layer will reside on the mainframe computer at the HHSDC.

- The *Data Layer* represents the physical implementation of the logical data model of the system as well as data stored on peripheral devices attached to the mainframe. The databases supporting the TRAC Application are implemented in DB2 on the mainframe computer at the HHSDC. Peripheral storage includes direct access storage devices (DASD) and tape devices maintained as part of the HHSDC computing complex.

6.2 Data Architecture

The primary function of the TRAC Application is the gathering, storage, and retrieval of data. The data architecture provides a description of the characteristics of data storage within the system. The collection and storage of data are illustrated in the following figure.

Figure 10: Data Architecture Diagram



The data architecture is organized into three areas, External Data, Data Processes and Internal Data. These areas encompass both internal and external data storage used by the TRAC Application. The data files are linked by processes that act upon the data and transform it either by location, format, content, or a combination of these factors. Each area is described in the following paragraphs:

- *External Data* is composed of information directly under the control of the users of the project. Included in this area are the conversion data files, data rejected by

the ongoing load process, report data, and data submitted through online update transactions. The storage of the common format data in this category (all data except the online update transactions) is on peripheral devices of the HHSDC. Specific details of the format and content characteristics of the conversion and report data files can be found in the **Detailed Design Specification Document**.

- *Data Processes* are composed of application programs and data utilities that transform the stored data. Data that resides in either the external or internal areas of the architecture is available to these processes via channel connection between the mainframe and its' peripheral devices (DASD and Tape). Specifications for the custom programs in the data processes can be found in the **Detailed Design Specification Document**.
- *Internal Data* is composed of information directly under the control of the project. Included in this area are the central database and the backup datasets. The storage of the data in this category is on peripheral devices of the HHSDC. These files are protected by the backup procedures of the Data Center to protect against hardware failures, and by the processes of the project to protect against data loss or corruption. Specific details of the backup processes for these files can be found in the **Detailed Design Specification Document**. Internal details of the storage methods used in the implementation of the database are represented in the lower portion of the diagram.

6.2.1 DB2 Database Implementation

The central database of the project is implemented using version 5.1 of the DB2 for OS/390 relational database from IBM. This database is well understood and supported at both the project and Data Center levels. It was chosen for the original implementation of the SAWS-TA system (SIS) and for the associated SCI and MEDS systems as a low risk option to meet the database requirements of the projects.

DB2 fulfills the current requirements of the TRAC database for storage capacity, security, and support of online transactions. It is highly scalable so that it may expand to meet the future needs of the system as well. Capacity information describing the current and forecast requirements of the TRAC Application can be found in the ***Capacity Plan*** section of this document.

In the implementation of DB2 within the project, several decisions have been made. These decisions affect the manner in which data is stored at a physical level within the database. The following points discuss these items:

- *Two subsystems are implemented to support the project.* All production and training activity is located within the B3PD subsystem. Development, integration test, user acceptance test, and performance testing environments share the B3TD subsystem. This split between the environments allows the production DB2 system to be tuned for ongoing performance in routine, statewide operations and to be isolated from any variability in structure or work load resulting from

development or testing activity. Training is allocated to the B3PD subsystem so that it can be connected to CICS regions with statewide access. The development and testing systems can only be accessed within the local connections of the project offices and datacenter facilities.

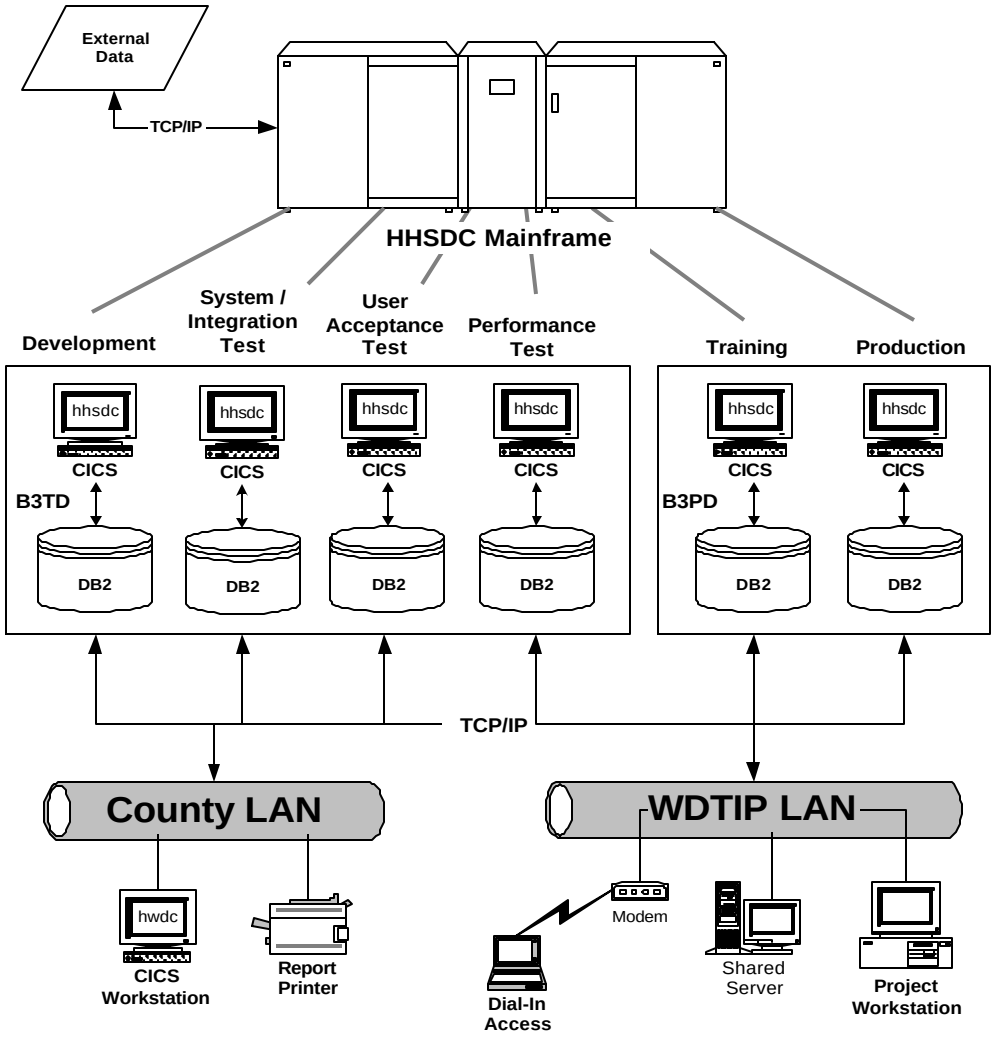
- *Individual databases are defined to support each environment.* By defining separate databases to support development, system / integration test, and user acceptance test the separate environments may take advantage of unique data storage devices. Separate databases also provide an easy vehicle for support of multiple versions of the database in the different environments.
- *Multiple bufferpools are defined to each database.* Data and Index datasets are allocated to separate bufferpools. Queries into the database will have a higher probability of locating target data in segregated bufferpools than if a single pool of memory is used.

  Two additional bufferpools are defined to support the many reference tables of the database. These tables are small enough to be fully loaded into the bufferpool space. Once loaded, they will remain resident as long as the DB2 subsystem remains active (1 week under normal operating conditions).
- *Tables are defined into unique tablespaces.* Tables are stored in segmented or partitioned tablespaces. The use of tablespaces (simple or segmented) which contain multiple tables complicates maintenance of the database. Some DB2 utilities, such as LOAD with the REPLACE option, RECOVER, COPY, and REORG, operate only on a tablespace or a partition. By separating tables into individual tablespaces, maintenance operations such as data load, image copy, and reorganization can be performed with the impact restricted to a single table.

6.3 Computing Environments

This section provides a description of the physical computing environments utilized by the project for development, testing and production activities. Multiple environments are maintained to support the different phases of the project lifecycle. The physical environments necessary to support the project are related to each other through shared resources in the HHSDC. The five environments are depicted in the following figure.

Figure 11: Physical Computing Environments



The diagram shows multiple environments sharing a single mainframe computer system. This shared environment at the HHSDC is connected to both the project and county offices via a TCP/IP communication protocol. The separate environments depicted as sharing the mainframe resources support the following activities:

- *Development:* This environment is the primary vehicle for the construction of the TRAC Application. It is composed of a unique DB2 database connected to one

CICS region. The development DB2 database is defined on the B3TD DB2 subsystem. The CICS region is connected to the online components of the SCI and MEDS development systems.

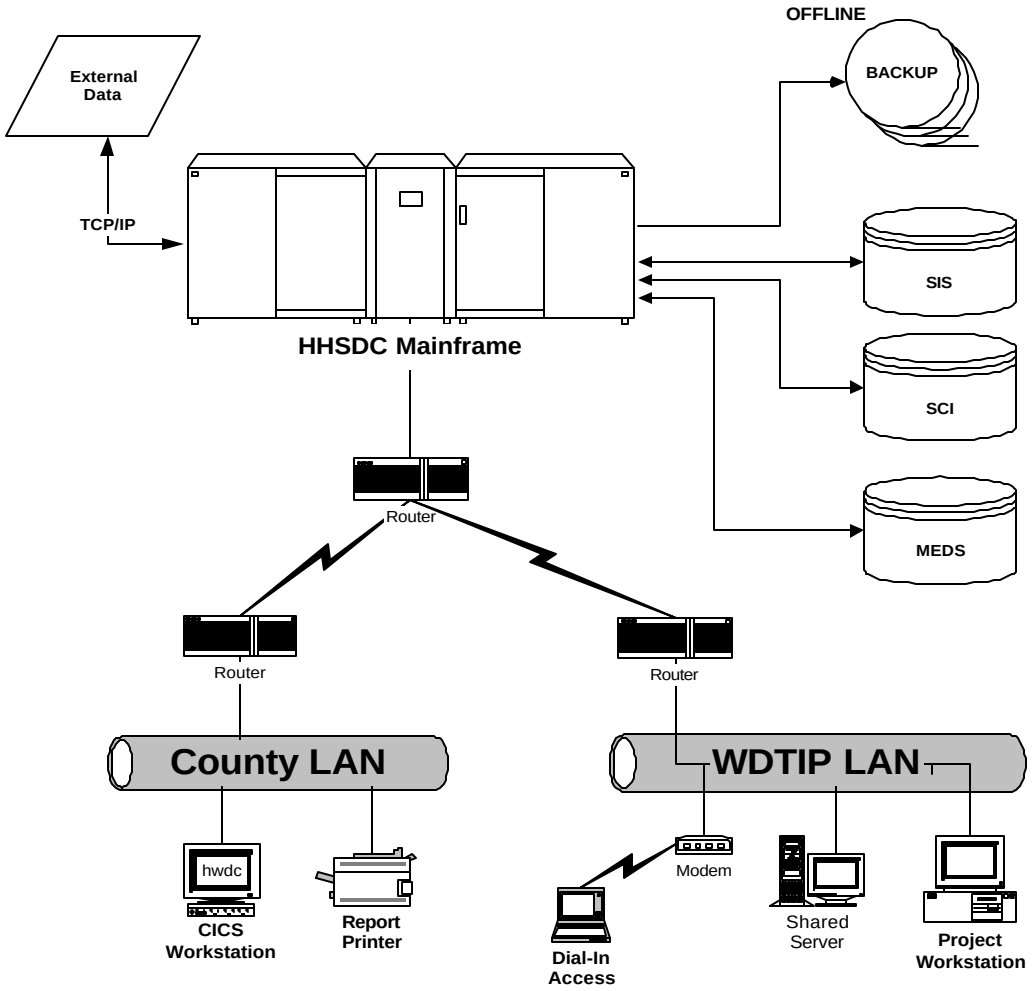
- *System / Integration Test:* This environment supports internal testing of groups of applications programs and the system as a whole. The environment contains DB2 and CICS components similar to the development environment. The DB2 database is defined on the B3TD subsystem and is connected to one CICS region. The CICS region is unique to this environment. It provides connections for the online components of the TRAC Application to the TRAC database and to the SCI and MEDS development systems.
- *User Acceptance Test:* This environment supports user testing of groups of TRAC Applications programs and the system as a whole. The environment contains DB2 and CICS components similar to the system/integration test environment. The DB2 database is defined on the B3TD subsystem and is connected to one CICS region. The CICS region is unique to this environment. It provides connections for the online components of the TRAC Application to the TRAC database and to the SCI and MEDS acceptance test systems.
- *Performance Test:* This environment supports full volume stress testing of TRAC Application programs and the system as a whole. The environment contains DB2 and CICS components similar to the proposed production environment. The DB2 database is defined on the B3TD subsystem and is connected to one CICS region. The CICS region is unique to this environment. It provides connections for the online components of the TRAC Application to the TRAC database and to the SCI and MEDS acceptance test systems.
- *Training:* This environment supports user training. The environment contains DB2 and CICS components similar to the proposed production environment. The CICS region attached to this environment will be available statewide through any production MEDS terminal. It will provide connections for the online components of the TRAC Application to the TRAC database and to the SCI and MEDS training and production systems respectively. The DB2 database is defined on the B3PD subsystem.
- *Production:* This environment supports the final implementation of the finished TRAC Application. It is composed of a unique DB2 database connected to CICS. The DB2 database is defined on the B3PD subsystem. The CICS region is unique to this environment. It provides connections for the online components of the TRAC Application to the TRAC database and to the SCI and MEDS systems.

6.3.1 Computing Environment Topology

The computing environment supporting the TRAC Application development, testing, and implementation activity of the project resides on the computing systems maintained at HHSDC. The Data Center operates multiple interconnected mainframe computers with associated direct and sequential access devices. The capacity of the Data Center is designed to meet the combined requirements of all client organizations. The project offices are connected to HHSDC via a LAN/WAN system using a TCP/IP communication protocol.

The following figure depicts the major components of the physical computing environment. The figure is generalized to apply to all six of the environments. Environmental differences will be discussed in the associated text.

Figure 12: Computing Environment Topology



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The six computing environments of the project (development, system / integration test, user acceptance test, performance stress test, training and production) share a similar

physical topology. Each computing environment is assembled from system components. Those components interact with each other through interfaces. The interfaces between components operate following rules called concepts of execution. The ***System Components*** subsection provides a description of the major system components. Interface design and concept of execution are combined in the ***Component Interface Design and Operation*** subtopic.

6.3.1.1 System Components

The computing environment is made up of the following major components. All components are fully developed and have been implemented since project inception. The project will not create any new system hardware or shared software components for this category.

- *HHSDC Mainframe:* Multiple interconnected ES/9000 series computers operating under OS/390 control in a tightly coupled environment. Shared access is provided by direct VTAM communication and through TCP/IP connection to remote users.
- *Peripheral Data Storage Devices:* Direct and sequential storage devices directly connected to the mainframe computers. DASD is operated in a redundant array at RAID level 5 (see ***Reference*** section of this document) to provide protection against hardware failure.
- *Major Software Packages:* Of primary importance to the TRAC are DB2 and CICS. Both packages are described in the ***Software*** section of this document. DB2 and CICS are owned by the Data Center and run on a charge back basis for the clients of the HHSDC. System level maintenance and support for the software is supplied by HHSDC personnel.
- *Router:* A device that accepts communication signals from computing equipment and forwards those signals to predefined destinations. Routers can be used to reformat as well as redirect communications within a network.
- *Modem:* A device that accepts communication signals from computing equipment and converts those signals into a format compatible with telephone networks.
- *Printer:* A device that accepts data from computing equipment and converts that data into printed output.
- *Workstations:* Personal computers, primarily Intel based, used as terminals for the mainframe computer. These workstations are located in both county and project offices and provide 3270 emulation support for mainframe communication as well as stand alone and LAN/WAN attached computing capabilities.
- *Shared Servers:* Large personal computers, primarily Intel based, used as controlling and storage points on the LAN and WAN networks within the project and county offices.

6.3.1.2 Component Interface Design and Operation

Component interfaces describes the dynamic relationship of the components. It shows how they will interact during system operation. Included, where applicable, is information showing flow of execution control, data flow, priorities among components,

handling of interrupts, concurrent execution, dynamic allocation/deallocation, dynamic creation/deletion of objects and exception handling.

The interfaces described here occur both within the TRAC Application and between the TRAC Application and the county users. The interface connecting the project offices in Sacramento to the HHSDC are essentially the same as those connecting county offices throughout the state to the Data Center. External interfaces are covered in the ***External Interfaces*** section of this document.

- *Mainframe to Workstation Interface*: HHSDC mainframe to Workstation communication will be supported by a 3270 or 3270 terminal emulation session operating in a TCP/IP environment with a socket connection to the OS/390 operating system.

  Concurrent sessions are supported through dynamic allocation of terminal IP addresses. All sessions are capable of two-way communication with no inherent priority given to any individual session. Communication level exception conditions are handled by the constituent software of the communication link and may result in the suspension or termination of an individual session. Individual session termination will not impact the stability of concurrent sessions using the same protocol for connection to the TRAC Application.

  HHSDC and project personnel provide support for the communication interface. Location determines the personnel responsible for supporting the communication interface. Project personnel work with hardware and software located in the project offices only. HHSDC personnel support all components located between the project office and the HHSDC, at the HHSDC, or linking HHSDC with the county locations.

- *Database to TRAC Application Interface*: DB2 communication to the TRAC Application programs is supported by the attachment facility of DB2 itself. TRAC Application programs requesting a data link with DB2 will establish a connection (called a thread) and transmit commands and data to the database across that linkage.

  Concurrent threads are supported to the database and by extension to the constituent objects within the database. All threads are capable of two-way communication. Priority is not established among thread connection by DB2, but access to DB2 objects may have priority assigned that will cause a thread to wait until an object becomes available. Exception conditions occurring in the attachments may cause an individual thread to be terminated by DB2. Termination of a single thread will not cause the termination of concurrent threads to the same subsystem. Error diagnostic messages are sent to the originator of the thread prior to termination.

  HHSDC and project personnel provide support for the DB2 interface. Logical, rather than physical, location determines the personnel responsible for supporting

the interface. Project personnel work to define access paths and objects within a DB2 subsystem. Connection of the subsystem to the HHSDC mainframe operating system and support of the thread-monitoring environment are the responsibility of HHSDC database support personnel.

7 Capacity Plan

7.1 Capacity Planning Overview

Capacity planning is the systems and network management discipline that helps predict future information technology resource needs. Capacity planning uses historical trends and information on new or changing workloads to help the project avoid shortages and to meet its service level objectives.

An effective capacity plan offers two benefits. First, with a sound plan, the TRAC Application will rarely experience poor response time, throughput, or TRAC Application process outages due to resource shortfalls. Second, with enough lead-time, the project can plan upgrades to capacity well ahead of the actual need, providing a smoother growth pattern to the TRAC Application.

Capacity planning is traditionally carried on at an enterprise level with input from key segments of the organization. Enterprise capacity planning is concerned with measuring and forecasting essential resources such as CPU, I/O, storage, memory, and network capacity. Physical requirements for Data Center floor space and the need for adequate staffing are also factors in planning at this level. The planning staff of the HHSDC addresses all of these issues.

7.1.1 Approach

The TRAC Application capacity plan is more narrowly focused on requirements contained entirely within the boundaries of the TRAC Application. This section of the document will cover the following topics:

- Batch processing requirements
- Online processing requirements
- Data storage requirements
- Backup requirements

Within these subject areas, data will be presented on the current, or baseline, status of the system. Forecasts of future activity and growth rates are provided where available along with an explanation of the basis for those forecasts. Selected summary information is presented in this section of the document. Supporting data is organized and presented in the ***Appendix*** section. The forecast estimates are based on the best information we have up to date and may change over time. The forecast estimates were reviewed with consortia technical staff members.

The basis for the data presented in this section is the existing SIS DB2 database. A batch load process receiving daily input data from the MEDS system populates this database. The content of the data in the existing SIS database is very similar to the TRAC Application design making it a valid starting point for forecasting capacity requirements. Detailed statistical information on the storage requirements of the current system can be found in the ***Appendix*** section of this document.

7.1.2 DASD Pool Characteristics

Shared DASD space is used extensively to fulfill the requirements for storage in the TRAC Application. This common pool of interconnected storage devices is established and maintained at the HHSDC. The Data Center uses redundant storage devices (RAID level 5) to protect client data against loss due to failure of the device.

Automated systems running at the Data Center maintain availability of space on the system. Non DB2 datasets (such as incoming flat files) that are unused for a period of time are transferred to offline storage (tape cartridges) in order to maintain the availability of space in the DASD pool. Datasets may move from DASD to tape and back to DASD many times in this manner. The location of the dataset is transparent to the TRAC Application using the dataset. This process allows the clients of the Data Center, the sponsors of this project among them, to allocate storage as needed without being restricted by preset size limits.

HHSDC personnel monitor the supply and demand for storage in this pool and will contact the project's technical support group in the event of an unusual demand for storage space.

7.2 Batch Processing Requirements

Batch processing requirements for the system include initial conversion of the county data, ongoing load of the daily transactions from the county, transmission of data rejected in the conversion and load processing and report processing. Daily volumes are based primarily on the average current volume experienced in the MEDS file processing used to load the TRAC database. Additional volume resulting from direct data transmitted from the counties is calculated as a percentage of the MEDS volume. Volumes and assumptions are shown in the following table along with references to supporting data.

Process	**Forecast Volume**	**Basis**
Initial Conversion of county data	10,700,000 individuals and associated data 8 gigabytes	100% of the data currently associated with the total count of individuals in the database (See ***Appendix*** section***, Database Column Variability*** subsection)
Ongoing Load	525,000 transactions 600,000,000 bytes	150% of the current MEDS median daily volume plus 1 standard deviation (See ***Appendix*** section***, MEDS Daily Load Volumes*** subsection)

Process	Forecast Volume	Basis
Rejected Data from daily load	Between 12,000 and 48,000 transactions Up to 54,000,000 bytes	Assuming 2 to 8% failures in the edits of incoming data. Heavier volumes may occur during the early stages of system startup. (See ***Appendix*** section***, MEDS Daily Load Volumes*** subsection)
Report Processing	38,000,000 bytes	Summary processing will be short, (50 to 100KB / report). Up to 10 reports may be produced per county per day. 38 million bytes will allow the production of 580 50-page reports each day. The final design of the reports is expected to be less than this figure, but this figure is used for estimating in order to provide a margin for growth or unexpected volumes.

7.2.1 Batch Processing Growth

Initial Conversion is a one-time event and growth estimates are not pertinent.
Forecasts for Ongoing Load volumes are expected to remain relatively stable for the 12-month period following implementation. Including a one standard deviation margin in the original estimate already factors in variability. Daily volumes can also be influenced by factors that are beyond the scope of this capacity plan (e.g., legislative policy changes that could impact data volumes).

Rejected Data and Report processing are driven by the Ongoing Load volumes and will vary accordingly over the coming 12 months.

7.3 Online Processing Requirements

Online Inquiry and Update transaction volume is estimated as a function of the daily transaction volumes currently measured in the system. A baseline measurement of online activity prior to the conversion of any county shows an average daily volume of 3,700 transactions. It is estimated that the TRAC Application will be expected to support combined online inquiry and update activity equal to 20 to 40% of the average daily load volume, or between 59,000 and 118,000 transactions per day.

7.4 Data Storage Requirements

Data Storage requirements for the TRAC Application include DB2 defined storage to house the central database and sequential file storage to support the files passing to and from the counties. Volumes and assumptions are shown in the following table along with references to supporting data.

Data Type	Forecast Volume	Basis
DB2	33 gigabytes of aggregate storage including both data and index space	DB2 statistics (See ***Appendix*** section***, Database Tablespace Statistics*** subsection)
Ongoing Load Input Files	600,000,000 bytes	150% of the current MEDS median daily volume plus 1 standard deviation (See ***Appendix*** section***, MEDS Daily Load Volumes*** subsection)
Rejected Data from daily load	Up to 54,000,000 bytes	Assuming 2 to 8% failures in the edits of incoming data. Heavier volumes may occur during the early stages of system startup. (See ***Appendix*** section***, MEDS Daily Load Volumes*** subsection)
Report Processing	38,000,000 bytes	Summary processing will be short, (50 to 100KB / report). Up to 10 reports may be produced per county

7.4.1 Data Storage Growth

DB2 storage space is allocated on a shared basis and is variable within the total storage capability of the HHSDC. The Database Support Group at that facility will be notified of the storage requirements for the TRAC database. This TRAC Application will use a very small fraction of the total DB2 defined storage available.

TRAC DB2 storage utilization shall be monitored on an ongoing basis by the database support personnel of the project. Database administration tools available on the mainframe allow the support personnel to monitor growth in the individual tablespaces and indexes and schedule maintenance to alter the sizing of the objects when necessary. At current size and load volumes, the database has shown itself to be extremely stable since its inception. Estimates of growth for the 12-month period following implementation range from 5 to 10% per month depending on the individual tablespace being addressed. The apparent disparity between the daily load volume and the low growth rate is explained by the fact that only a minority of transactions actually result in a database update within our system. Of those update transactions, even fewer result in the addition of new rows to the database, the majority update existing rows in place, resulting in no change in storage requirements.

7.5 Backup Requirements

Backup requirements for the TRAC Application include Image Copies of the database and sequential file backups to support the files passing to and from the counties. Much of the backup volume will utilize offline, or tape cartridge, storage.

Backup Type	Forecast Volume	Basis
DB2 Image Copy	14 to 25 tape cartridges per day	Current full image copy runs use 14 cartridges. Retention of the copies is for 35 days at which time the cartridges are returned to the library. Five percent growth over 12 months will increase the daily requirement to 25 cartridges.
Ongoing Load Input Files	1.8 gigabyte (DASD) 32 tape cartridges	Assuming 3 days of online (DASD) storage and 32 days on tape cartridges for a total of 35 days of historical data. (See ***Appendix*** section***, MEDS Daily Load Volumes*** subsection)
Rejected Data from daily load	Up to .1 gigabyte DASD 32 tape cartridges	Assuming 3 days of online (DASD) storage and 32 days on tape cartridges for a total of 35 days of historical data. (See ***Appendix*** section***, MEDS Daily Load Volumes*** subsection)
Report Processing	Up to .1 gigabyte DASD 32 tape cartridges	Assuming 3 days of online (DASD) storage and 32 days on tape cartridges for a total of 35 days of historical data.

7.5.1 Backup Growth

DB2 backup requirements are based on current full-image copy procedures for the TRAC database. Any change in this procedure could reduce the requirement for tape cartridges, but will not increase it unless the retention requirements are lengthened beyond the current 35 days.

The depth of the backup for the sequential files of the project is estimated at 35 days total retention. The backups will be accomplished using a pushdown stacking of datasets that will automatically retain the specified number of generations. Requirements in the **Detailed Design Specification Document** may result in changes to these estimates.

7.6 Computing Environment Sizing

The estimates in the preceding subsections have all addressed the production computing environment of the SAWS-TA application. There are five other environments, each

requiring storage in varying amounts. The following sections will address those requirements in relation to the production environment.

- **Development:** The Development region will require a scaled down copy of the production TRAC DB2 database. Twenty-five percent of the operational production storage will be allocated to support this environment. Separate sequential file storage will be allocated for the use of the region. Sequential storage will utilize shared DASD devices and will not be restricted by predefined limits. Online transaction volumes are expected to be small. However, the environment will be configured to accept production transaction volumes in both the online and batch areas. Backup requirements for DB2 will be identical to those in production.
- **System / Integration Test:** The System / Integration Test region will require a scaled down copy of the production TRAC DB2 database. Fifty percent of the operational production storage will be allocated to support this environment. Separate sequential file storage will be allocated for the use of the region. Sequential storage will utilize shared DASD devices and will not be restricted by predefined limits. Online transaction volumes will vary widely with the testing being performed. The environment will be configured to accept production transaction volumes in both the online and batch areas. Backup requirements for DB2 will be identical to those in production.
- **User Acceptance Test:** User acceptance test will require a full size copy of the production TRAC DB2 storage. Sequential file storage will share the production file storage without increasing the space used. Online transaction volumes will vary widely with the testing being performed. The environment will be configured to accept production transaction volumes in both the online and batch areas. Backup requirements for DB2 will be identical to those in production.
- **Performance Stress Test:** Performance stress test will require a full size copy of the production TRAC DB2 storage. Separate sequential file storage will be allocated for the use of the region. Online transaction volumes will vary widely with the testing being performed. The environment will be configured to accept production transaction volumes in both the online and batch areas. Backup requirements for DB2 will be identical to those in production.
- **Training:** The Training region will require a scaled down copy of the production TRAC DB2 database. Fifty percent of the operational production storage will be allocated to support this environment. Separate sequential file storage will be allocated for the use of the region. Sequential storage will utilize shared DASD devices and will not be restricted by predefined limits. Online transaction volumes will vary widely with the training being performed. The environment will be configured to accept production transaction volumes in both the online and batch areas. Backup requirements for DB2 will be identical to those in production.
- **Configuration Management Requirements:** Files required to store the controlled objects will be allocated on the shared DASD pool of the Data Center. As in all other files using this pool of storage, no predefined limitations will be set.

Aggregate storage requirements for the six computing environments will remain relatively stable over time. HHSDC will be notified in advance when large blocks of storage are being allocated or released so that the shared DASD pool may be properly managed.

8 External Interfaces

8.1 Overview

This section will describe the interface characteristics of the systems that communicate with the TRAC Application during each phase of its lifecycle. Each interfacing system will be described in its own subsection. The following subsections will be covered:

- County Interfaces
  - Consortium I
    ISAWS, GEMS
  - Consortium II
    LEADER, GEARS
  - Consortium III
    WCDS, TOA, Ventura
  - Consortium IV
    Merced, Riverside, San Bernardino, Stanislaus

- State Interfaces
  - MEDS
  - SCI
  - SIS

The figure on the following page will illustrate the relationship between the external interfaces listed above.

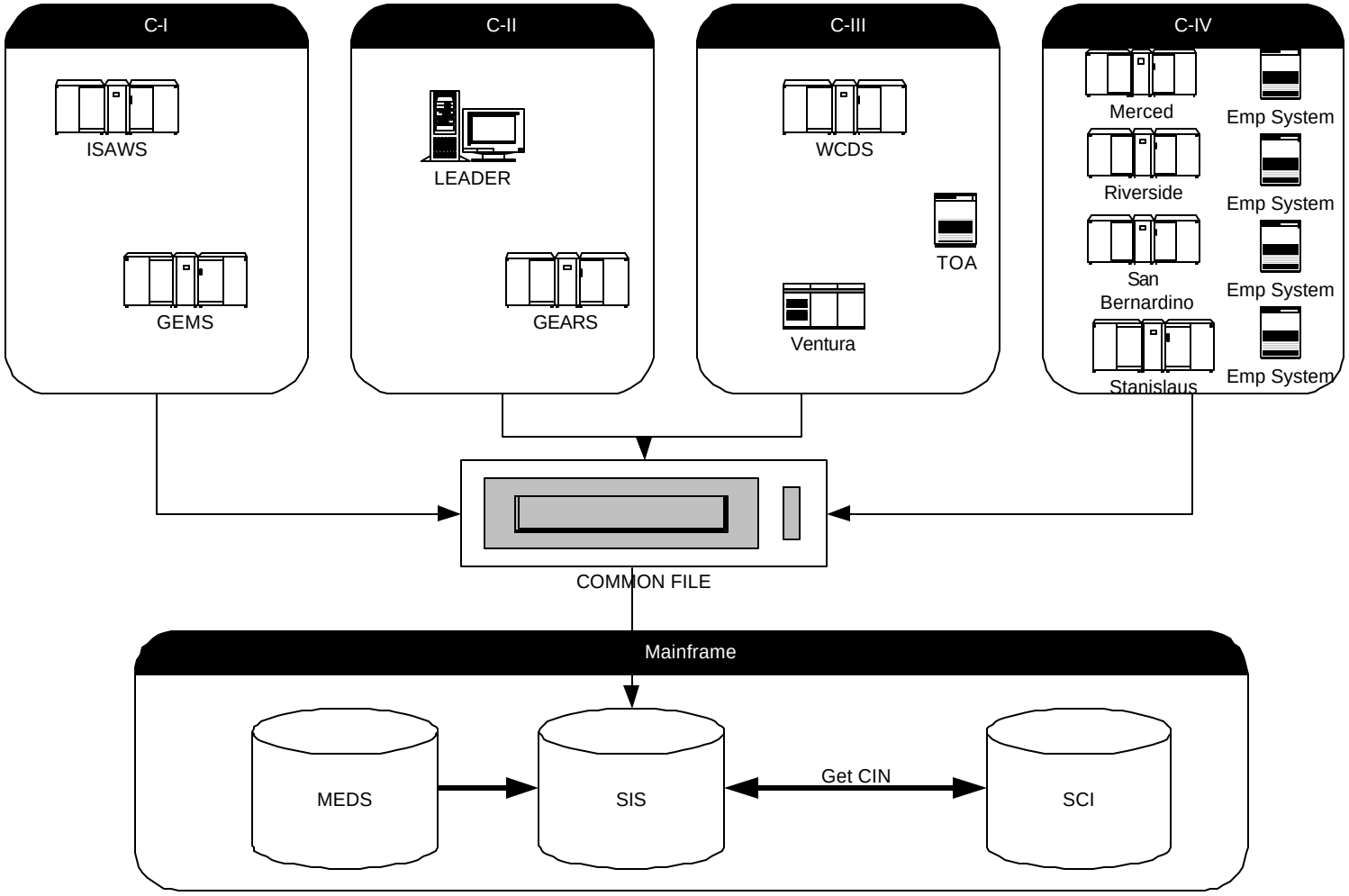

Figure 13: External Interfaces

The following subsections will describe the current landscape of systems that will interact with the TRAC Application.

8.2 County Interfaces

The primary system architectures in the existing welfare landscape are a mix of SAWS consortium automated welfare systems, and non-SAWS systems. To better define the technical environment, and place the TRAC Application in context, each county consortium is briefly described below. For a complete list of all the counties and their associated consortium, please refer to the ***Appendix*** section of this document.

8.2.1 Consortium I

The Interim Statewide Automated Welfare System (ISAWS) is now fully implemented, and comprised of Microsoft Window clients connected to a Unisys OS/2200 and MAPPER based application. Utilizing the HHSDC TCP/IP frame relay network, the ISAWS solution also provides wide area email via Microsoft Exchange. Now in the maintenance phase, ISAWS personnel continue to make improvements to the ISAWS application using an organized change management process. Welfare clients are identified and added using online inquiry and update transactions to SCI. All programmatic data changes are stored in the county systems on the central mainframes, until they are posted to MEDS in a nightly batch process. ISAWS uses a MAPPER database and application development environment.

8.2.2 Consortium II

Los Angeles County is in the midst of implementing the Los Angeles Eligibility, Automated Determination, Evaluation and Reporting System (LEADER), while relying on existing legacy systems until LEADER is fully implemented in all districts. LEADER is architected with Microsoft Windows based personal computers containing the LEADER client application written in PowerBuilder. Clients connect through the UniAccess middleware to a Unisys OS/2200 based application and data server. As in ISAWS, multiple interfaces to SCI, MEDS and other systems have been constructed. Welfare clients will be identified and added using online inquiry and update transactions to SCI, while all programmatic data changes are stored in the LEADER system on the central mainframe, until they are posted to MEDS in a nightly batch process.

8.2.3 Consortium III

The existing Welfare Case Data System (WCDS) system is a mainframe-based batch processing system that supports workers throughout seventeen of the eighteen WCDS Consortium counties. Ventura County operates a separate county specific welfare system at this time. Eligibility Workers access the WCDS system via IBM 3270 terminals and 3270 terminal emulation software running on PCs. The WCDS applications utilize VSAM data files and COBOL programs on the host mainframe. All programmatic data changes are stored in the county systems until they are posted to MEDS in a nightly batch process.

8.2.4 Consortium IV

8.2.4.1 Merced County

Merced Automated Global Information Control System (MAGIC) is the automated system for determining eligibility and delivery of benefits for Temporary Assistance to Needy Families (TANF), Food Stamp, Medi-Cal, Foster Care and Refugee programs. MAGIC is an integrated, on-line eligibility determination and benefit payment system that makes use of client-server technology. MAGIC operates on a three-tiered architecture. It is supported by an IBM mainframe (Model 9672), a Hewlett Packard HP 9000 H60 RISC-based mini-computer, and an expert system running on independent workstations at the desktop level in the Human Service Agency. Staff use Pentium-based workstations running Windows 95 to access MAGIC.

8.2.4.2 Riverside County

The Riverside County DPSS Machine Budgeting System (MBS) is a mainframe-based batch processing system that supports workers throughout the County. Dedicated terminals and emulation software running on PCs provide access to the County's shared IBM mainframe through a Local Area Network (LAN) for agency staff. Many of these PCs are used to connect to the mainframe systems. The County Data Center (CDC) provides services to DPSS in a shared computing environment utilizing an IBM 9672 CMOS R33 that provides the centralized processing capability for the County. The IBM system is connected through 3270 terminals. The County also maintains a Tandem EXT25 mini-computer at that site with dedicated terminals and emulators. DPSS staff also support nineteen Compaq Proliant file servers used to run the client-server applications in the Administrative Services, Temporary Assistance and Medi-Cal (TAMD), Social Services, Employment Services divisions. Personal computers use either the Microsoft Windows 3.11 or MS DOS 6.22 operating systems.

8.2.4.3 San Bernardino County

San Bernardino County operates a centralized welfare system that uses a mainframe, dedicated terminals for on-line input and inquiry, and PC workstations. The system is primarily batch, with eligibility workers coding input documents for key entry by data entry staff. The San Bernardino County Data Center maintains an IBM ES/9000 mainframe that is shared with other County agencies. The mainframe serves as the main data repository for cases and devotes approximately 18% of its capacity to welfare-related processing. New Pentium II-based file servers have recently been installed in local offices. These servers have been added to the existing servers provided by the Child Welfare Services/Case Management System (CWS/CMS). The County currently uses both 486 and Pentium workstations running Windows 3.11 and 3270 emulation software. In addition to the PCs, San Bernardino uses dedicated terminals in the districts to access the County database and statewide systems.

8.2.4.4 Stanislaus County

Stanislaus County operates a centralized, mainframe-based welfare system that supports workers throughout the County. The system is generally batch oriented, utilizing data entry clerks to create input files that are processed overnight. Some functionality is being

migrated to run on Local Area Networks (LANs) to support the Agency's emphasis on becoming independent of the shared IBM ES9000 9672 mainframe. Stanislaus County has installed a number of Pentium-based servers throughout the Agency. The servers link a mixture of 386, 486, and Pentium workstations. The PCs run the Windows 3.11 operating system and 3270 emulation software for mainframe access.

8.3 State Interfaces

A variety of statewide systems are integral to the current automated welfare environment, and they include SIS, MEDS and SCI.

8.3.1 SIS

The existing SAWS Information System (SIS) database is being modified to maintain all of the required data elements necessary to address the new functional requirements of the TRAC Application. However, the database does not currently support county data loads and on-going county updates. The TRAC Application will include tables in the TRAC database to capture new data. Because MEDS does not carry this data, a one-time conversion of county data will be required to populate the TRAC tables. After conversion, each county will send a daily batch update to the TRAC database with any changes in status. The system will have all the data necessary to compute the total time on aid for each individual welfare recipient in the State of California.

Individual information is stored in the SIS using the Client Index Number (CIN) as a statewide identifier. Statewide Client Index (SCI) generates a CIN for every welfare applicant in the state. The CIN is used to couple the data in the SIS and SCI. The data in the SIS were initially loaded from MEDS and are kept current via daily update transactions from MEDS. This implementation design tightly links the SIS to MEDS. In the TRAC Application, it will be necessary for the TRAC to receive data directly from county systems and not from MEDS.

8.3.2 MEDS

MEDS is a mainframe based system providing a single centralized integrated VSAM file of all TANF, Medically Needy, and SSI/SSP recipients (excluding unborns) in California. The purpose of MEDS is to facilitate the issuance of Benefit Identification Cards (BIC), retain Medi-Cal eligibility data, and control overlapping eligibility for prepaid and fee-for-service benefits and eliminate multi-county eligibility.

8.3.3 SCI

The Statewide Client Index (SCI) is a mainframe-based system utilizing a DB2 relational database and CICS/COBOL business and data access logic modules. SCI was developed by DHS to provide statewide individual identification information and a single statewide Client Index Number (CIN) for all welfare recipients in California. An enhanced version, linked to the TRAC will be developed jointly between HHSDC, CDHS and CDSS to provide identification of clients, a directory of past and present system involvement for each client; and a unique key for accessing client information in each system of involvement.

9 Hardware

This section provides a high level description of the internal computing components utilized by the project. It should be noted that the project will utilize the HHSDC's existing hardware infrastructure and will not deliver any new hardware components. Below is a high level illustration of the HHSDC's current hardware infrastructure environment:

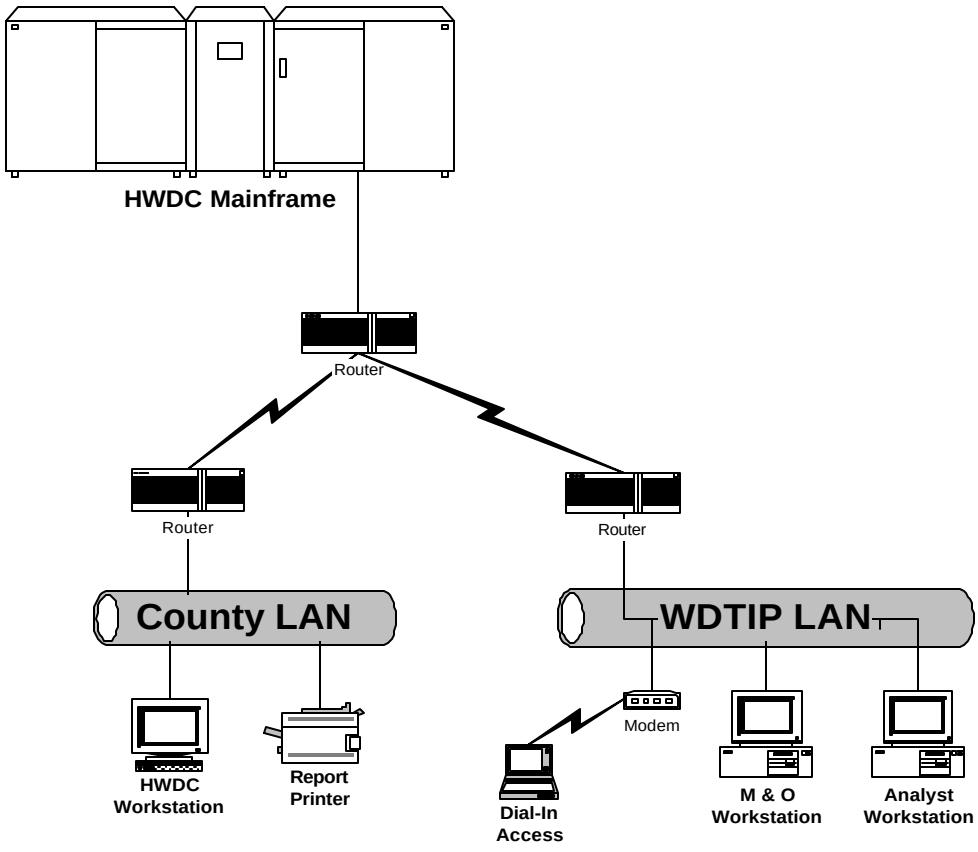

Figure 14: HHSDC's current hardware infrastructure environment

The TRAC Application will reside on the current IBM mainframe located at the HHSDC Data Center, which uses the OS/390 operating system. The communications network will be the current frame relay network supplied and maintained by the HHSDC.

The central TRAC database will reside on the HHSDC mainframe. The TRAC is implemented on version 5 of IBM's DB2 relational database for the OS/390 operating system. Refer to the ***External Interfaces*** section of this document for a detail description

of the TRAC. All data access programs for the TRAC Application will be written in COBOL II on the OS/390 operating system. The full complement of IBM mainframe-based tools are necessary for operations and maintenance. Refer to the ***Software*** section of this document for a detail description of all the software tools, including IBM mainframe-based tools utilized on the WDTIP.

Each county will access the TRAC Application either through 3270 compliant terminals or through personal computers using a 3270 emulation package. Similarly, the project team will have access to the HHSDC mainframe via 3270 terminals and PCs emulating the 3270 protocol for development, testing and training purposes.

10 Software

This section will contain a list of software tools that are used in support of the TRAC Application. The software tools and the products that it produces (configuration items as well as the system architecture itself) shall be controlled based on set procedures described in the **Configuration Management Plan** deliverable.

The purpose of the CMP is to identify and describe the overall policies and methods for Configuration Management (CM). The Configuration Control Board (CCB) will be the reviewing and controlling body that exercises established processes to classify, approve or reject, release, implement and confirm changes to agreed specifications and baselines. Refer to the **Configuration Management Plan** deliverable for further details about the CCB.

10.1 Workstation Software

Workstation software refers to third party supplied and custom developed software used by project members on personal computing workstations.

10.1.1 ERwin

ERwin is a database-modeling tool. ERwin will be used as the primary tool to create the TRAC data model during the detail design phase of the project. The tool has many powerful features that let you design entity relationship models and dimensional models. ERwin's most powerful feature is its simplicity and ease of use.

10.1.2 Microsoft Outlook

Outlook is used for communicating information among team members. The communication will be in the form of Emails. It is also used as a scheduling tool to schedule project meetings, events and activities.

10.1.3 Microsoft Office

Microsoft Office contains a suite of software that includes MS Access, MS Word, and MS Excel. Microsoft Office is used for word processing, documentation and data processing on the WDTIP Project.

10.1.4 Attachmate Extra Personal Client Version 6.5

The Attachmate Extra Personal Client Version 6.5 software is used as the 3270 emulation for the TRAC Application.

10.2 LAN Software

LAN software refers to third party supplied and custom developed software used by project members on the WDTIP LAN.

10.2.1 IBM Book Manager
IBM Book Manager contains all IBM related reference manuals. It is an additional help resource for the project team to use.

10.3 Mainframe Software
Mainframe software refers to third party supplied and custom developed software used by project members on the HHSDC mainframe.

10.3.1 COBOL-II
COBOL stands for Common Business Oriented Language. COBOL will be the host language used in the project. It is used to communicate instructions to the computer.

10.3.2 DB2
The database for this project is DB2 version 5, release 1. The database will store all data elements of the TRAC Application.

10.3.3 CICS
The screen interface will be coded in CICS (Customer Information Control System) Version 4, release 1.

10.3.4 JCL
Users communicate with the operating system by issuing commands, or Job Control Language (JCL). JCL will be used for compiling and executing the Jobs.

10.3.5 FILE-AID
File-Aid is a software tool that will be used for basic functions like Edit, Browse, and Copy all kind of data files on the mainframe.

10.3.6 ESP
ESP stands for Execution Scheduling Processor. ESP is used to schedule the order of execution of jobs.

10.3.7 RACF
Mainframe security is managed using the Resource Access Control Facility (RACF) provided by IBM. Refer the **Configuration Management Plan** for details on RACF.

10.3.8 JEM
JEM stands for Job Execution Manager. It is a JCL utility tool that provides the following primary functions:

- Scans JCL to find various problems, including syntax errors, allocation errors, SMS errors, IMS errors, DB2 errors, IDCAMS errors, etc.
- Displays or print JCL listings.
- Enforces site-specific JCL coding standards.

- Make many kinds of changes to JCL libraries, such as adding or deleting parameters, changing the values of existing parameters, and adding or deleting entire JCL statements.
- Reformat JCL to site standards so that it is uniform and easy to read.

10.3.9 XPEDITER

XPEDITER is a stand-alone tool, used for the On-line & Batch testing. The project will use XPEDITER for the purpose of debugging programs. This tool will help programmers and analysts find program errors in less time.

10.3.10 SUPERC

SUPERC is a IBM utility used for comparing datasets. SUPERC is a fast and versatile compare program that processes two sequential data sets, two complete partitioned data sets (PDS), members from two PDSs, or concatenated data sets. The software can also compare datasets of unlimited size and record lengths at the file, line, word, or byte level. SuperC requires only the names of the input data set. In addition, SuperC creates a variety of output listings that make it easy to locate data differences. Delta listings, long listings, summary listings, and side-by-side line listings are examples.

10.3.11 COMPAREX

COMPAREX/ISPF is an online interface to the COMPAREX utility. COMPAREX will be used to compare datasets in the database. It can be used to compare any number of records.

10.3.12 SEARCH-FOR

The Search-For utility is used to search data sets for one or more strings of data. This utility is similar to the ISPF/PDF "find" function but extends the search to multiple data sets and to partitioned data sets. The utility lists the results of the search in an output data set that you can browse. Users can use the Search-for utility to:

- Find occurrences of 1 or more strings of data.
- Search through an entire dataset or search for specific members of a partitioned data set.
- Store results of the search in the data set that the users specify or in a default data set.
- Execute the search in Foreground or Batch mode.

10.3.13 IOF

IOF stands for Interactive Output Facility. IOF is utilized to show the output status of the jobs submitted. It will display the status of running jobs, including job errors.

10.3.14 SAR

SAR stands for Sysout Archival and Retrieval. Like IOF, it is utilized to show the output status of the jobs submitted.

10.3.15 JOBSCAN

JOBSCAN is utilized to scan JCL to find hundreds of different potential problems, including syntax errors, allocation errors, SMS errors, IMS errors, DB2 errors, IDCAMS errors, and many others. Its main functions include:

- Display or print JCL listings.
- Enforce site-specific JCL coding standards.
- Make many kinds of changes to JCL libraries, such as adding or deleting parameters, changing the values of existing parameters, and adding or deleting entire JCL statements.
- Reformat JCL to site standards so that it is uniform and easy to read.

10.3.16 DB2 Tools

10.3.16.1 QMF

QMF stands for Query Management Facility. It is a DB2 tool that utilizes an on-line process to execute SQL statements.

10.3.16.2 SPUFI

SPUFI stands for SQL Processing Using File Input. It is a DB2 tool that utilizes a batch process to execute SQL statements.

10.3.16.3 PLATINUM

Platinum Technology, Inc. has developed a suite of tools designed to aid database administrators in the management of DB2 database objects in a mainframe environment. These tools provide a sophisticated and flexible environment for the development and maintenance of DB2 databases. The tool suite is composed of four primary applications and several related utilities. Two primary applications will be used extensively within the project, RC/Query and RC/Migrate. Refer to the **Configuration Management Plan** for details on Platinum.

11 Appendices

11.1 MEDS Daily Load Volumes

The current daily load volumes from the MEDS system to the SIS database daily load application are shown in the following table. Data from the most recent two months was selected and used in the calculation of totals and average statistics.

MEDS Daily Load Volumes to SIS Batch Load Process

Date	Transactions	Bytes		Date	Transactions	Bytes
7/29/99	171,517	193,642,693		6/30/99	407,789	460,393,781
7/27/99	585,124	660,604,996		6/29/99	163,298	184,363,442
7/26/99	75,004	84,679,516		6/28/99	178,071	201,042,159
7/24/99	26,776	30,230,104		6/25/99	306,447	345,978,663
7/23/99	384,245	433,812,605		6/24/99	108,121	122,068,609
7/22/99	631,173	712,594,317		6/23/99	286,696	323,679,784
7/21/99	74,541	84,156,789		6/22/99	158,509	178,956,661
7/20/99	345,171	389,698,059		6/21/99	171,084	193,153,836
7/19/99	375,762	424,235,298		6/18/99	321,831	363,347,199
7/16/99	431,939	487,659,131		6/17/99	207,059	233,769,611
7/15/99	376,067	424,579,643		6/16/99	455,795	514,592,555
7/14/99	226,674	255,914,946		6/15/99	420,066	474,254,514
7/13/99	257,625	290,858,625		6/14/99	220,066	248,454,514
7/12/99	196,114	221,412,706		6/11/99	349,329	394,392,441
7/09/99	267,322	301,806,538		6/10/99	425,435	480,316,115
7/08/99	229,571	259,185,659		6/09/99	397,643	448,938,947
7/07/99	228,446	257,915,534		6/08/99	469,532	530,101,628
7/06/99	338,262	381,897,798		6/07/99	269,131	303,848,899
7/02/99	188,659	212,996,011		6/04/99	202,766	228,922,814
7/01/99	159,890	180,515,810		6/03/99	270,563	305,465,627
				6/02/99	340,874	384,846,746
				6/01/99	367,964	415,431,356
Totals:	5,569,882	6,288,396,778			6,498,069	7,336,319,901
Averages:	278,494	314,419,839			295,367	333,469,086
Median:	243,598	275,022,142			296,572	334,829,224
Standard. Deviation:	158,116	178,512,698			108,359	122,336,950

11.2 SIS Database Tablespace Statistics

The current volume and storage statistics for the database are presented in the following chart. The volumes are listed for data stored in the DB2 tablespaces and for the index spaces as well. Row counts for the data and index portions of the database accompany the storage figures. The table is organized in alphabetical sequence by table name.

TABLESPACE & COMPONENT OBJECT SPACE STATISTICS
DSISP02 7/27/2000

TABLE SPACE	TBSPACE KBYTES	TABLE	TABLE ROWS	INDEX	INDEX KBYTES	INDEX ROWS
SBTRXLOG	1,728	BATCH_TRX_LOG	50	XBTRXLOG0	576	50
SCKPSTAT	48	CKPTCNTL_STATS	0	XCKPSTAT0	48	0
SCKPTBL	48	CKPTCNTL_TABLE	0	XCKPTBL0	48	0
SEXPRRSN	288	EXCPT_PROCESS_RSN	92	XEXPRRSN0	48	92
SCWKS18D	1,249,920	SIS_CALWRKS_18_DTL	0	XCWKS18D0	662,400	0
SCWKS60D	1,802,880	SIS_CALWRKS_60_DTL	16,005,738	XCWKS60D0	1,324,800	16,005,738
SCHSPRMB	33,840	SIS_CHLD_SUP_REIMB	0	XCHSPRMB0	25,200	0
SCINCMBA	18,720	SIS_CIN_COMB_AUDIT	119,683	XCINCMBA0	24,480	119,683
SCINCOMB	3,600	SIS_CIN_COMBINATN	35,136	XCINCOMB0	1,152	35,136
SCODES	960	SIS_CODES	290	XCODES	96	290
SCTADPRS	288	SIS_CTY_ADULT_PRSN	284	XCTADPRS0	48	284
SCTYINFO	288	SIS_CTY_INFO	62	XCTYINFO0	48	62
SCTYCIN	2,833,920	SIS_CTYID_CIN	26,659,624	XCTYCIN0	1,946,880	26,659,624
				XCTYCIN2	858,960	18,218,263
SDLYRCLC	230,400	SIS_DAILY_RECALC	0	XDLYRCLC0	299,520	0
SERRMSG	288	SIS_ERROR_MSG	244	XERRMSG0	48	244
SEXCPFIL	714,960	SIS_EXCEPTION_FILE	0	XEXCPFIL0	35,280	0
SINDV	5,143,680	SIS_INDV	10,691,291	XINDV0	414,720	10,691,291
SNONCAP	43,200	SIS_NONCAPT	0	XNONCAP0	29,520	0
SPROGDIV	673,920	SIS_PGM_DIV	2	XPROGDIV0	385,920	2
SPGEXCP	1,261,440	SIS_PGM_EXCPT	0	XPGEXCP0	927,360	0
SPGMTYP	288	SIS_PGM_TYPE	42	XPGMTYP0	48	42
SPGEXRT	288	SIS_PGMEX_RSN_TYPE	46	XPGEXRT0	48	46
SPGMPTTY	288	SIS_PGMPT_TYPE	323	XPGMPTTY0	48	323
SPROGPT	3,767,040	SIS_PROG_PT	42,247,934	XPROGPT0	2,039,040	42,247,934
SSCHLPT	288	SIS_SCREEN_HP_TYPE	321	XSCHLPT0	48	321
SSTATECD	288	SIS_STATE_CD	51	XSTATECD0	48	51
SSUPSRV	57,600	SIS_SUP_SRV	0	XSUPSRV0	25,200	0
STANF60D	2,073,600	SIS_TANF_60_DTL	21,540,273	XTANF60D0	1,424,160	21,540,273
STMCLK	806,400	SIS_TIME_CLOCK	10,690,355	XTMCLK0	241,920	10,690,355
STRXNAV	288	SIS_TRX_NAVIGATION	23	XTRXNAV0	48	23
SU10G	22,320	SIS_UNDER10_GRANT	0	XU10G0	13,680	0
SUPDLOG	156,240	SIS_UPDATE_LOG	0	XUPDLOG0	48,240	0
SWTW	489,600	SIS_WTW	0	XWTW0	270,720	0
Totals:	**21,388,944**				**11,000,400**	
Grand Total:	**32,389,344**					

11.3 WDTIP Database Column Variability

The attributes of the WDTIP production database are examined on a monthly basis by a statistics gathering utility within DB2. The information acquired from this utility is used by the DB2 system to define the most efficient access paths available to the data contained in the entities of the database.

In addition to this system use, information on the content and activity within the attributes is used by both systems analysts and database administrators when they are researching characteristics of the database. The following chart contains a listing of the entities and attributes defined to the database. The number of unique data values stored, or cardinality, is shown for each attribute. This measurement is often used in determining candidate attributes for index columns, or for spotting potential trouble spots in the database.

WDTIP (DSISP02) DATA ELEMENT VARIABILITY
August 07, 2000

Table Name	Column Name	Unique Values (Cardinality)	Column Type	Size	Null ?	Dflt ?	Default Value
BATCH_TRX_LOG	LAST_UPDATE_ENTITY	0	CHAR	2	N	N	
	BATCH_NUM	0	CHAR	4	N	N	
	TRX_VERSION	0	CHAR	2	N	N	
	TOTAL_REC	0	INTEGER	4	N	N	
	TOTL_REC_PROCESSED	0	INTEGER	4	N	N	
	VALID_FILE_FG	0	CHAR	1	N	Y	
	FILE_CREATED_DT	0	DATE	4	N	Y	
	LAST_UPDATED_TS	0	TIMESTMP	10	N	Y	
CKPTCNTL_STATS	JOBNAME	0	CHAR	8	N	N	
	STEPNAME	0	CHAR	8	N	N	
	PGMNAME	0	CHAR	8	N	N	
	JOB_START_TIME	0	TIMESTMP	10	N	N	
	JOB_END_TIME	0	TIMESTMP	10	N	N	
	RUN_TIME_SECONDS	0	INTEGER	4	N	N	
	CKPTS_TAKEN	0	INTEGER	4	N	N	
	NBR_RUNS	0	SMALLINT	2	N	N	
	INPUT_RECORDS	0	INTEGER	4	N	N	
	OUTPUT_RECORDS	0	INTEGER	4	N	N	
CKPTCNTL_TABLE	CKPTCNTL_KEY	27	CHAR	20	N	N	
	CKPTCNTL_FREQ	1	CHAR	4	N	N	
	CKPTCNTL_INTERNAL	1	CHAR	56	N	Y	
EXCPT_PROCESS_RSN	EXCPT_RSN_CD	92	CHAR	3	N	N	
	EXCPT_RSN_NAM	92	CHAR	254	N	N	

Table Name	Column Name	Unique Values (Cardinality)	Column Type	Size	Null ?	Dflt ?	Default Value
SIS_CALWRKS_18_DTL	CIN_NUM	0	CHAR	9	N	N	
	CREATED_TS	0	TIMESTMP	10	Y	Y	
	MTH_YR_CLK_1	0	DECIMAL	6	N	Y	
	CLK_IND_1	0	CHAR	1	N	1	-
	MTH_YR_CLK_2	0	DECIMAL	6	N	Y	
	CLK_IND_2	0	CHAR	1	N	1	-
	MTH_YR_CLK_3	0	DECIMAL	6	N	Y	
	CLK_IND_3	0	CHAR	1	N	1	-
	MTH_YR_CLK_4	0	DECIMAL	6	N	Y	
	CLK_IND_4	0	CHAR	1	N	1	-
	MTH_YR_CLK_5	0	DECIMAL	6	N	Y	
	CLK_IND_5	0	CHAR	1	N	1	-
	MTH_YR_CLK_6	0	DECIMAL	6	N	Y	
	CLK_IND_6	0	CHAR	1	N	1	-
	MTH_YR_CLK_7	0	DECIMAL	6	N	Y	
	CLK_IND_7	0	CHAR	1	N	1	-
	MTH_YR_CLK_8	0	DECIMAL	6	N	Y	
	CLK_IND_8	0	CHAR	1	N	1	-
	MTH_YR_CLK_9	0	DECIMAL	6	N	Y	
	CLK_IND_9	0	CHAR	1	N	1	-
	MTH_YR_CLK_10	0	DECIMAL	6	N	Y	
	CLK_IND_10	0	CHAR	1	N	1	-
	MTH_YR_CLK_11	0	DECIMAL	6	N	Y	
	CLK_IND_11	0	CHAR	1	N	1	-
	MTH_YR_CLK_12	0	DECIMAL	6	N	Y	
	CLK_IND_12	0	CHAR	1	N	1	-

Table Name	Column Name	Unique Values (Cardinality)	Column Type	Size	Null ?	Dflt ?	Default Value
SIS_CALWRKS_60_DTL	CIN_NUM	7,950,411	CHAR	9	N	N	
	CREATED_TS	16,005,738	TIMESTMP	10	N	Y	
	MTH_YR_CLK_1	31	DECIMAL	6	N	Y	
	CLK_IND_1	2	CHAR	1	N	1	-
	MTH_YR_CLK_2	31	DECIMAL	6	N	Y	
	CLK_IND_2	3	CHAR	1	N	1	-
	MTH_YR_CLK_3	30	DECIMAL	6	N	Y	
	CLK_IND_3	3	CHAR	1	N	1	-
	MTH_YR_CLK_4	29	DECIMAL	6	N	Y	
	CLK_IND_4	3	CHAR	1	N	1	-
	MTH_YR_CLK_5	28	DECIMAL	6	N	Y	
	CLK_IND_5	3	CHAR	1	N	1	-
	MTH_YR_CLK_6	27	DECIMAL	6	N	Y	
	CLK_IND_6	3	CHAR	1	N	1	-
	MTH_YR_CLK_7	26	DECIMAL	6	N	Y	
	CLK_IND_7	3	CHAR	1	N	1	-
	MTH_YR_CLK_8	25	DECIMAL	6	N	Y	
	CLK_IND_8	3	CHAR	1	N	1	-
	MTH_YR_CLK_9	24	DECIMAL	6	N	Y	
	CLK_IND_9	3	CHAR	1	N	1	-
	MTH_YR_CLK_10	23	DECIMAL	6	N	Y	
	CLK_IND_10	3	CHAR	1	N	1	-
	MTH_YR_CLK_11	22	DECIMAL	6	N	Y	
	CLK_IND_11	3	CHAR	1	N	1	-
	MTH_YR_CLK_12	21	DECIMAL	6	N	Y	
	CLK_IND_12	3	CHAR	1	N	1	-
SIS_CHLD_SUP_REIMB	CIN_NUM	0	CHAR	9	N	N	
	CREATED_TS	0	TIMESTMP	10	N	Y	
	CHILD_SUP_EFF_MTH	0	DECIMAL	6	N	N	
	LAST_UPDATE_ENTITY	0	CHAR	2	N	N	
	LAST_UPDATE_USER	0	CHAR	12	N	N	
	LAST_UPDATED_TS	0	TIMESTMP	10	N	Y	
SIS_CIN_COMB_AUDIT	CIN_PRIMARY	33,830	CHAR	9	N	N	
	SECNDRY_CREATED_TS	119,683	TIMESTMP	10	N	Y	
	SECNDRY_CTY_CD	58	CHAR	2	N	N	
	TABLE_NAME	2	CHAR	18	N	N	
	CIN_SECONDARY	36,783	CHAR	9	N	N	
SIS_CIN_COMBINATN	CIN_SECONDARY	35,136	CHAR	9	N	N	
	CIN_PRIMARY	28,145	CHAR	9	N	N	
	LAST_UPDATE_ENTITY	57	CHAR	2	N	N	
	LAST_UPDATE_USER	340	CHAR	12	N	N	
	LAST_UPDATED_TS	35,136	TIMESTMP	10	N	Y	

Table Name	Column Name	Unique Values (Cardinality)	Column Type	Size	Null ?	Dflt ?	Default Value
SIS_CODES	CODE_VAL	273	CHAR	8	N	N	
	CODE_TYP	8	CHAR	10	N	N	
	START_DT	1	DATE	4	N	N	
	SHORT_NAM	290	CHAR	30	N	N	
	HELP_TXT	290	CHAR	254	N	Y	
	END_DT	1	DATE	4	N	N	
SIS_CTY_ADULT_PRSN	CTY_CD	23	CHAR	2	N	N	
	ADULT_PRSN_NUM	42	CHAR	2	N	N	
SIS_CTY_INFO	CTY_CD	62	CHAR	2	N	N	
	CTY_NAME	62	CHAR	20	N	N	
	EARLIEST_DATA_DT	12	DATE	4	N	1	0001-01-01
	CTY_CONVERTED_FG	1	CHAR	1	N	1	N
	CONVERSION_OPT_IND	4	CHAR	1	N	N	
	CIN_CTY	2	CHAR	1	N	N	
	UNCP_FG	2	CHAR	1	N	1	N
	UDIV_FG	2	CHAR	1	N	1	N
	UCSR_FG	2	CHAR	1	N	1	N
	USSO_FG	2	CHAR	1	N	1	N
	CASE_FBU_REQ_FG	2	CHAR	1	N	1	N
	PRSN_NUM_REQ_FG	2	CHAR	1	N	1	N
SIS_CTY_INFO	AID_CD_REQ_FG	2	CHAR	1	N	1	N
	CONCURENT_EXCPT_FG	2	CHAR	1	N	1	N
	HWDC_ACCT_CD	62	CHAR	10	N	N	
SIS_CTYID_CIN	CIN_NUM	10,576,598	CHAR	9	N	N	
	CTY_CD	58	CHAR	2	N	N	
	CASE_SER_NUM	4,112,979	CHAR	7	N	N	
	CASE_FBU_MEDS_CD	38	CHAR	1	N	N	
	PRSN_NUM	264	CHAR	2	N	N	
	AID_CD	1	CHAR	2	N	Y	
	LAST_UPDATE_ENTITY	59	CHAR	2	N	N	
	LAST_UPDATE_USER	348	CHAR	12	N	N	
	LAST_UPDATED_TS	26,659,624	TIMESTMP	10	N	Y	
SIS_DAILY_RECALC	CIN_NUM	10,576,598	CHAR	9	N	N	
	PGM_DIV_FG	0	CHAR	1	N	1	N
	NON_CA_FG	0	CHAR	1	N	1	N
	PGM_EXCPT_FG	0	CHAR	1	N	1	N
	WTW_FG	0	CHAR	1	N	1	N
	PROCESS_STATUS_IND	0	CHAR	1	N	Y	
SIS_ERROR_MSG	ERROR_CD	224	CHAR	8	N	N	
	ERROR_TXT	224	CHAR	79	N	N	
	ERROR_DESC	224	CHAR	200	N	N	

Table Name	Column Name	Unique Values (Cardinality)	Column Type	Size	Null ?	Dflt ?	Default Value
SIS_EXCEPTION_FILE	CREATED_TS	0	TIMESTMP	10	N	Y	
	EXTRACT_FILE_TRANS	0	CHAR	175	N	Y	
	RECORD_NUM	0	DECIMAL	10	N	Y	
	REASON_CD	0	CHAR	3	N	Y	
	REASON_CD_DESC	0	CHAR	254	N	Y	
	FILE_ID	0	CHAR	8	N	Y	
SIS_INDV	CIN_NUM	10,691,291	CHAR	9	N	N	
	DOB	34,816	DATE	4	N	N	
	PGM_DIV_FG	1	CHAR	1	N	1	N
	CALWRKS_18_MTH_FG	1	CHAR	1	N	1	N
	CALWRKS_60_MTH_FG	2	CHAR	1	N	1	N
	TANF_60_MTH_FG	2	CHAR	1	N	1	N
	END_MTH_RECALC_FG	2	CHAR	1	N	1	N
	NON_CA_FG	1	CHAR	1	N	1	N
	PGM_EXCPT_FG	1	CHAR	1	N	1	N
	WTW_FG	1	CHAR	1	N	1	N
	LAST_UPDATE_ENTITY	60	CHAR	2	N	N	
	LAST_UPDATE_USER	352	CHAR	12	N	N	
	LAST_UPDATED_TS	10,691,291	TIMESTMP	10	N	Y	
SIS_NONCAPT	CIN_NUM	0	CHAR	9	N	N	
	CREATED_TS	0	TIMESTMP	10	N	Y	
	STATE_CD	0	CHAR	2	N	N	
	NONCAPT_START_DT	0	DATE	4	N	1	0001-01-01
	NONCAPT_END_DT	0	DATE	4	N	1	9999-12-31
	LAST_UPDATE_ENTITY	0	CHAR	2	N	N	
	LAST_UPDATE_USER	0	CHAR	12	N	N	
	LAST_UPDATED_TS	0	TIMESTMP	10	N	Y	
SIS_PGM_DIV	CIN_NUM	2	CHAR	9	N	N	
	CREATED_TS	2	TIMESTMP	10	N	Y	
	DIV_PYMT_DT	1	DATE	4	N	N	
	PGMTYPE_CD	1	CHAR	2	N	N	
	AID_CD	1	CHAR	2	N	N	
	DIV_AMT	1	DECIMAL	7	N	Y	
	DIV_COND_CD	1	CHAR	1	N	Y	
	DIV_RSN_CD	1	CHAR	3	N	1	000
	DIV_START_MTH	1	DECIMAL	6	N	N	
	DIV_END_MTH	1	DECIMAL	6	N	N	
	DIV_PYMT_NEED_FG	1	CHAR	1	N	1	N
	DIV_TANF_MTHS	1	DECIMAL	6	N	Y	
	DIV_CALWRKS_MTHS	1	DECIMAL	6	N	Y	
	LAST_UPDATE_ENTITY	1	CHAR	2	N	N	
	LAST_UPDATE_USER	1	CHAR	12	N	N	
	LAST_UPDATED_TS	2	TIMESTMP	10	N	Y	

Table Name	Column Name	Unique Values (Cardinality)	Column Type	Size	Null ?	Dflt ?	Default Value
SIS_PGM_EXCPT	CIN_NUM	0	CHAR	9	N	N	
	CREATED_TS	0	TIMESTMP	10	N	Y	
	PGMEXCPT_CD	0	CHAR	2	N	N	
	PGMEXCPT_RSN_CD	0	CHAR	3	N	N	
	PGMEXCPT_START_DT	0	DATE	4	N	1	0001-01-01
	PGMEXCPT_END_DT	0	DATE	4	N	1	9999-12-31
	PGMEXCPT_STRT_MTH	0	DECIMAL	6	N	N	
	PGMEXCPT_END_MTH	0	DECIMAL	6	N	N	
	LAST_UPDATE_ENTITY	0	CHAR	2	N	N	
	LAST_UPDATE_USER	0	CHAR	12	N	N	
	LAST_UPDATED_TS	0	TIMESTMP	10	N	Y	
SIS_PGM_TYPE	PGMTYPE_CD	42	CHAR	2	N	N	
	PGMTYPE_NAM	42	CHAR	10	N	N	
	PGMTYPE_TXT	42	CHAR	254	N	N	
	PGMTYPE_CASH_FG	2	CHAR	1	N	1	N
	START_DT	3	DATE	4	N	1	0001-01-01
	END_DT	1	DATE	4	N	1	9999-12-31
SIS_PGMEX_RSN_TYPE	PGMEXT_RSN_CD	46	CHAR	3	N	N	
	START_DT	36	DATE	4	N	1	0001-01-01
	PGMEXT_CD	5	CHAR	2	N	N	
	PGMEXT_RSN_NAM	43	CHAR	30	N	N	
	PGMEXT_RSN_TXT	46	CHAR	254	N	N	
	PGMEXT_TANF_60_FG	2	CHAR	1	N	N	
	PGMEXT_CW_60_FG	2	CHAR	1	N	N	
	PGMEXT_CW_1824_FG	2	CHAR	1	N	N	
	PGMEXT_END_DT_FG	2	CHAR	1	N	N	
	END_DT	1	DATE	4	N	1	9999-12-31
SIS_PGMPT_TYPE	AID_CD	167	CHAR	2	N	N	
	PGMTYPE_CD	16	CHAR	2	N	N	
	FED_STATE_ONLY_IND	3	CHAR	1	N	1	N
	START_DT	3	DATE	4	N	1	0001-01-01
	PGMPTTYPE_TXT	323	CHAR	254	N	Y	
	DIV_FG	2	CHAR	1	N	N	
	TANF_60_FG	2	CHAR	1	N	1	N
	CALWRKS_60_FG	2	CHAR	1	N	1	N
	CALWRKS_1824_FG	2	CHAR	1	N	1	N
	END_DT	3	DATE	4	N	1	9999-12-31

Table Name	Column Name	Unique Values (Cardinality)	Column Type	Size	Null ?	Dflt ?	Default Value
SIS_PROG_PT	CIN_NUM	9,466,685	CHAR	9	N	N	
	CREATED_TS	42,247,934	TIMESTMP	10	N	Y	
	PGMTYPE_CD	9	CHAR	2	N	N	
	AID_CD	142	CHAR	2	N	N	
	FED_STATE_ONLY_IND	1	CHAR	1	N	1	N
	CASE_SER_NUM	2,179,833	CHAR	7	N	N	
	CASE_FBU_MEDS_CD	39	CHAR	1	N	N	
	PGMPT_PRSN_NUM	172	CHAR	2	N	Y	
	PGMPT_START_DT	48	DATE	4	N	1	0001-01-01
	PGMPT_END_DT	65	DATE	4	N	1	9999-12-31
	PGMPT_START_MTH	1	DECIMAL	6	N	Y	
	PGMPT_END_MTH	1	DECIMAL	6	N	Y	
	PGM_DIS_RSN_CD	1	CHAR	3	N	Y	
	PARTICIPNT_TYPE_CD	3	CHAR	1	N	1	A
	MNR_PAR_FG	2	CHAR	1	N	1	N
	PGMPT_SYS_CD	1	CHAR	4	N	1	MEDS
	SRC_MEDS_SGMT_IND	4	CHAR	1	N	Y	
	LAST_UPDATE_ENTITY	61	CHAR	2	N	N	
	LAST_UPDATE_USER	316	CHAR	12	N	N	
	LAST_UPDATED_TS	42,247,934	TIMESTMP	10	N	Y	
SIS_SCREEN_HP_TYPE	HELP_MSG_CD	56	CHAR	6	N	N	
	HELP_MSG_ROW_NUM	21	DECIMAL	3	N	N	
	HELP_MSG_TYPE	2	CHAR	1	N	N	
	HELP_MSG_TYPE_NAM	37	CHAR	25	N	N	
	HELP_MSG_TXT	321	CHAR	80	N	Y	
SIS_STATE_CD	STATE_CD	51	CHAR	2	N	N	
	STATE_NAM	51	CHAR	20	N	N	
	STATE_TANF_DT	16	DATE	4	N	1	0001-01-01
SIS_SUP_SRV	CIN_NUM	0	CHAR	9	N	N	
	CREATED_TS	0	TIMESTMP	10	N	Y	
	SUP_SRV_EFF_MTH	0	DECIMAL	6	N	N	
	SUP_SRV_RSN_CD	0	CHAR	2	N	N	
	EMP_STS_FG	0	CHAR	1	N	N	
	LAST_UPDATE_ENTITY	0	CHAR	2	N	N	
	LAST_UPDATE_USER	0	CHAR	12	N	N	
	LAST_UPDATED_TS	0	TIMESTMP	10	N	Y	

Table Name	Column Name	Unique Values (Cardinality)	Column Type	Size	Null ?	Dflt ?	Default Value
SIS_TANF_60_DTL	CIN_NUM	9,150,121	CHAR	9	N	N	
	CREATED_TS	21,540,273	TIMESTMP	10	N	Y	
	MTH_YR_CLK_1	44	DECIMAL	6	N	Y	
	CLK_IND_1	2	CHAR	1	N	1	-
	MTH_YR_CLK_2	44	DECIMAL	6	N	Y	
	CLK_IND_2	3	CHAR	1	N	1	-
	MTH_YR_CLK_3	43	DECIMAL	6	N	Y	
	CLK_IND_3	3	CHAR	1	N	1	-
	MTH_YR_CLK_4	42	DECIMAL	6	N	Y	
	CLK_IND_4	3	CHAR	1	N	1	-
	MTH_YR_CLK_5	41	DECIMAL	6	N	Y	
	CLK_IND_5	3	CHAR	1	N	1	-
	MTH_YR_CLK_6	40	DECIMAL	6	N	Y	
	CLK_IND_6	3	CHAR	1	N	1	-
	MTH_YR_CLK_7	39	DECIMAL	6	N	Y	
	CLK_IND_7	3	CHAR	1	N	1	-
	MTH_YR_CLK_8	38	DECIMAL	6	N	Y	
	CLK_IND_8	3	CHAR	1	N	1	-
	MTH_YR_CLK_9	37	DECIMAL	6	N	Y	
	CLK_IND_9	3	CHAR	1	N	1	-
	MTH_YR_CLK_10	36	DECIMAL	6	N	Y	
	CLK_IND_10	3	CHAR	1	N	1	-
	MTH_YR_CLK_11	35	DECIMAL	6	N	Y	
	CLK_IND_11	3	CHAR	1	N	1	-
	MTH_YR_CLK_12	34	DECIMAL	6	N	Y	
	CLK_IND_12	3	CHAR	1	N	1	-
SIS_TIME_CLOCK	CIN_NUM	10,690,355	CHAR	9	N	N	
	CWRK_18_START_MTH	1	DECIMAL	6	N	Y	
	CWRK_18_END_MTH	1	DECIMAL	6	N	Y	
	CWRK_18_MTH_CLK	1	DECIMAL	2	N	Y	
	CWRK_18_EXCPT_MTHS	1	DECIMAL	2	N	Y	
	CWRK_60_START_MTH	32	DECIMAL	6	N	Y	
	CWRK_60_END_MTH	1	DECIMAL	6	N	Y	
	CWRK_60_MTH_CLK	32	DECIMAL	2	N	Y	
	CWRK_60_EXCPT_MTHS	1	DECIMAL	2	N	Y	
	CWRK_60_NCA_MTHS	1	DECIMAL	2	N	Y	
	TANF_60_START_MTH	45	DECIMAL	6	N	Y	
	TANF_60_END_MTH	1	DECIMAL	6	N	Y	
	TANF_60_MTH_CLK	45	DECIMAL	2	N	Y	
	TANF_60_EXCPT_MTHS	1	DECIMAL	2	N	Y	
	TANF_60_NCA_MTHS	1	DECIMAL	2	N	Y	
	LAST_UPDATED_TS	10,690,355	TIMESTMP	10	N	Y	

Table Name	Column Name	Unique Values (Cardinality)	Column Type	Size	Null ?	Dflt ?	Default Value
SIS_TRX_NAVIGATION	TRX_CD	23	CHAR	4	N	N	
	TRX_TYPE	1	CHAR	1	N	N	
	TRX_NAM	1	CHAR	25	N	N	
	PROG_NAM	17	CHAR	8	N	N	
	TRX_NAVIGATION_FG	2	CHAR	1	N	1	Y
SIS_UNDER10_GRANT	CIN_NUM	0	CHAR	9	N	N	
	CREATED_TS	0	TIMESTMP	10	N	Y	
	UNDR10GRNT_EFF_MTH	0	DECIMAL	6	N	N	
	LAST_UPDATE_ENTITY	0	CHAR	2	N	N	
	LAST_UPDATE_USER	0	CHAR	12	N	N	
	LAST_UPDATED_TS	0	TIMESTMP	10	N	Y	
SIS_UPDATE_LOG	CIN_NUM	0	CHAR	9	N	N	
	CREATED_TS	0	TIMESTMP	10	N	N	
	LOG_CREATED_TS	0	TIMESTMP	10	N	Y	
	UPDATE_TYPE	0	CHAR	1	N	N	
	UPDATED_TABLE	0	CHAR	18	N	N	
	UPDATED_COLUMN	0	CHAR	18	N	N	
	PREV_COLUMN_VALUE	0	CHAR	26	N	N	
	UPDATE_USER	0	CHAR	12	N	N	
SIS_WTW	CIN_NUM	0	CHAR	9	N	N	
	CTY_CD	0	CHAR	2	N	N	
	WRKPLAN_SIGN_DT	0	DATE	4	N	1	0001-01-01
	WTW_EXT_NUM	0	DECIMAL	2	N	N	
	CALWRKS_1824_IND	0	DECIMAL	2	N	N	
	LAST_UPDATE_ENTITY	0	CHAR	2	N	N	
	LAST_UPDATE_USER	0	CHAR	12	N	N	
	LAST_UPDATED_TS	0	TIMESTMP	10	N	Y	

11.4 11.4 Consortium List by County

County #	County Name	County Software	Consortium
1	Alameda	WCDS	C-III
2	Alpine	ISAWS	C-I
3	Amador	ISAWS	C-I
4	Butte	ISAWS	C-I
5	Calaveras	ISAWS	C-I
6	Colusa	ISAWS	C-I
7	Contra Costa	WCDS	C-III
8	Del Norte	ISAWS	C-I
9	El Dorado	ISAWS	C-I
10	Fresno	WCDS	C-III
11	Glenn	ISAWS	C-I
12	Humboldt	ISAWS	C-I
13	Imperial	ISAWS	C-I
14	Inyo	ISAWS	C-I
15	Kern	ISAWS	C-I
16	Kings	ISAWS	C-I
17	Lake	ISAWS	C-I
18	Lassen	ISAWS	C-I
19	Los Angeles	LEADER	C-II
20	Madera	ISAWS	C-I
21	Marin	ISAWS	C-I
22	Mariposa	ISAWS	C-I
23	Mendocino	ISAWS	C-I
24	Merced	C-IV	C-IV
25	Modoc	ISAWS	C-I
26	Mono	ISAWS	C-I
27	Monterey	ISAWS	C-I
28	Napa	ISAWS	C-I
29	Nevada	ISAWS	C-I
30	Orange	WCDS	C-III
31	Placer	WCDS	C-III
32	Plumas	ISAWS	C-I
33	Riverside	C-IV	C IV
34	Sacramento	WCDS	C-III
35	San Benito	ISAWS	C-I
36	San Bernardino	C-IV	C IV
37	San Diego	WCDS	C-III
38	San Francisco	WCDS	C-III
39	San Joaquin	ISAWS	C-I

County #	County Name	County Software	Consortium
40	San Luis Obispo	WCDS	C-III
41	San Mateo	WCDS	C-III
42	Santa Barbara	WCDS	C-III
43	Santa Clara	WCDS	C-III
44	Santa Cruz	WCDS	C-III
45	Shasta	ISAWS	C-I
46	Sierra	ISAWS	C-I
47	Siskiyou	ISAWS	C-I
48	Solano	WCDS	C-III
49	Sonoma	WCDS	C-III
50	Stanislaus	C-IV	C-IV
51	Sutter	ISAWS	C-I
52	Tehama	ISAWS	C-I
53	Trinity	ISAWS	C-I
54	Tulare	WCDS	C-III
55	Tuolumne	ISAWS	C-I
56	Ventura	WCDS (VACS)	C-III
57	Yolo	WCDS	C-III
58	Yuba	ISAWS	C-I